NATIONAL MUSEUM OF VICTORIA

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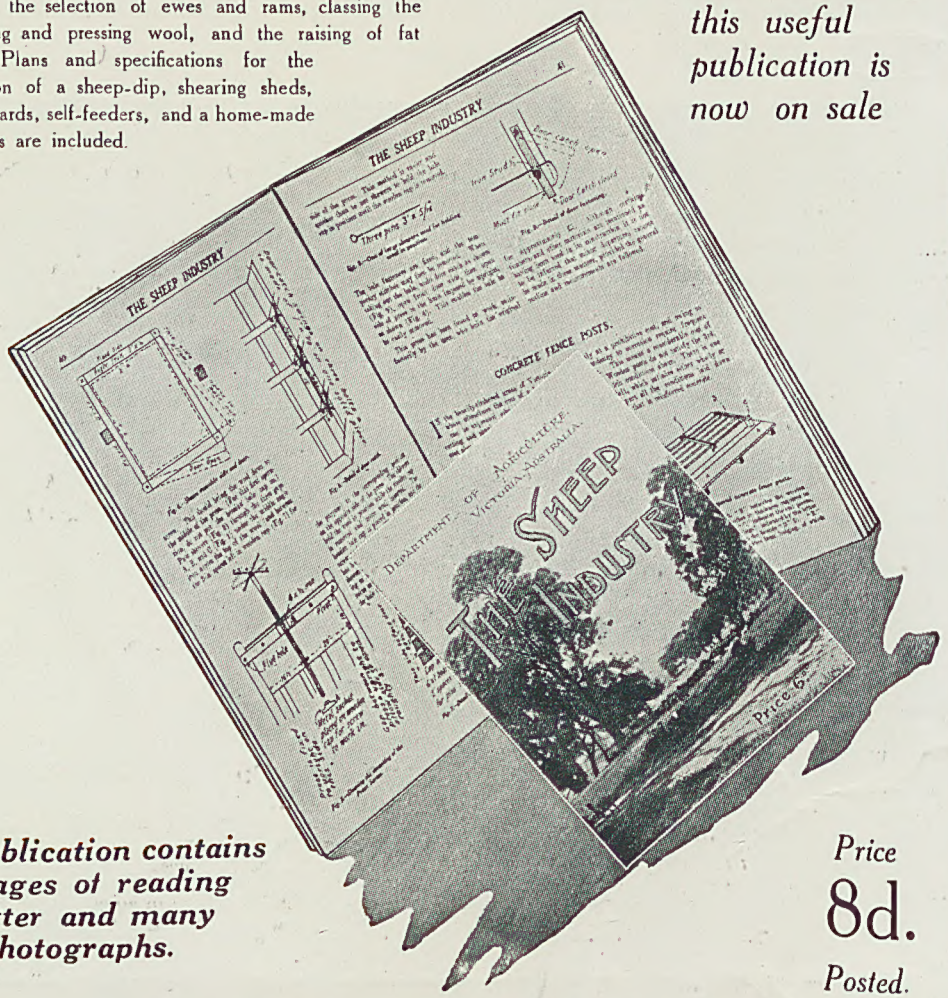

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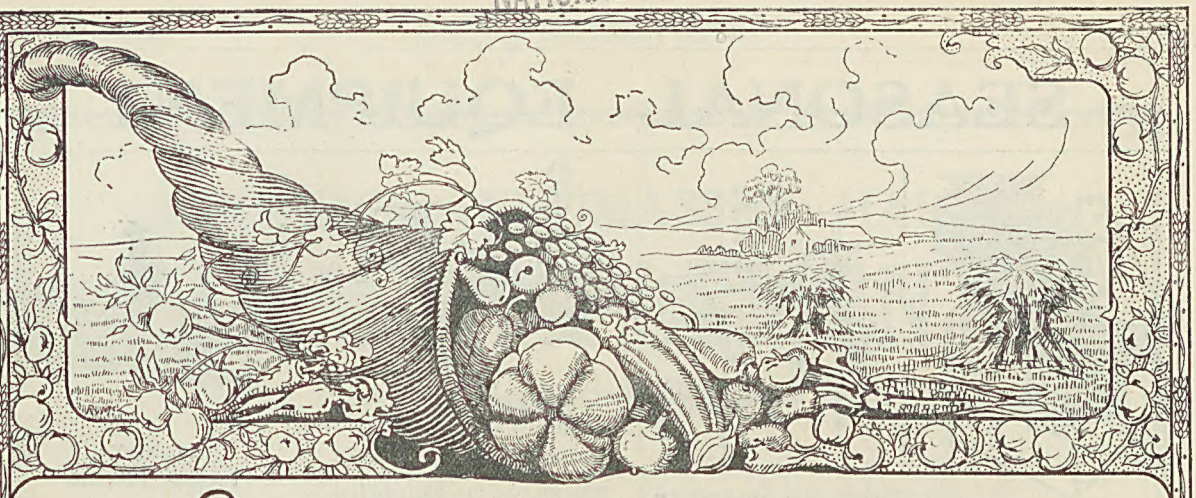

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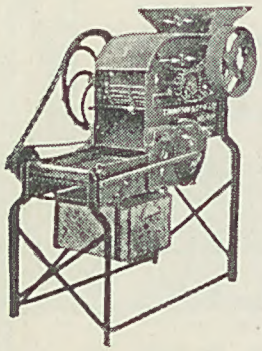

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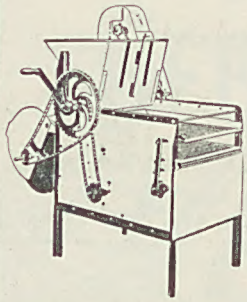

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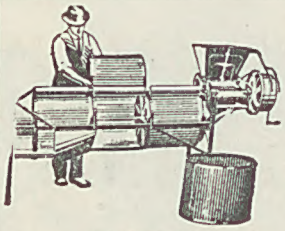

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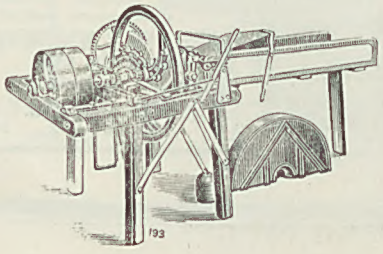

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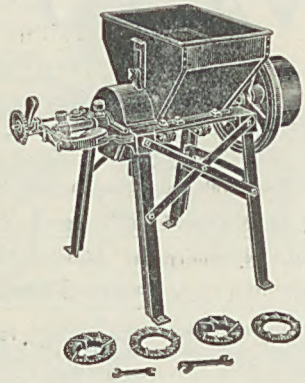

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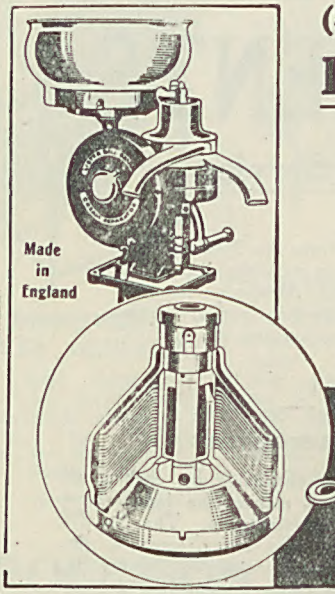

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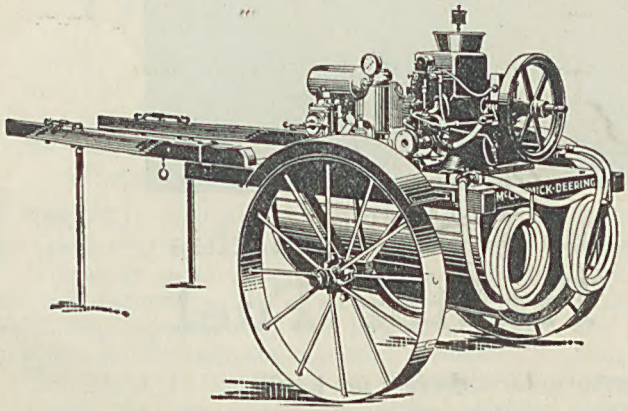

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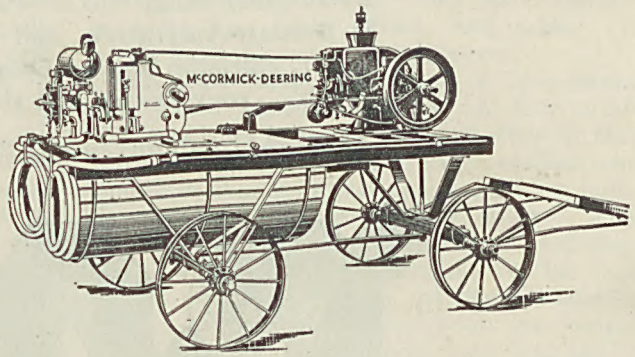

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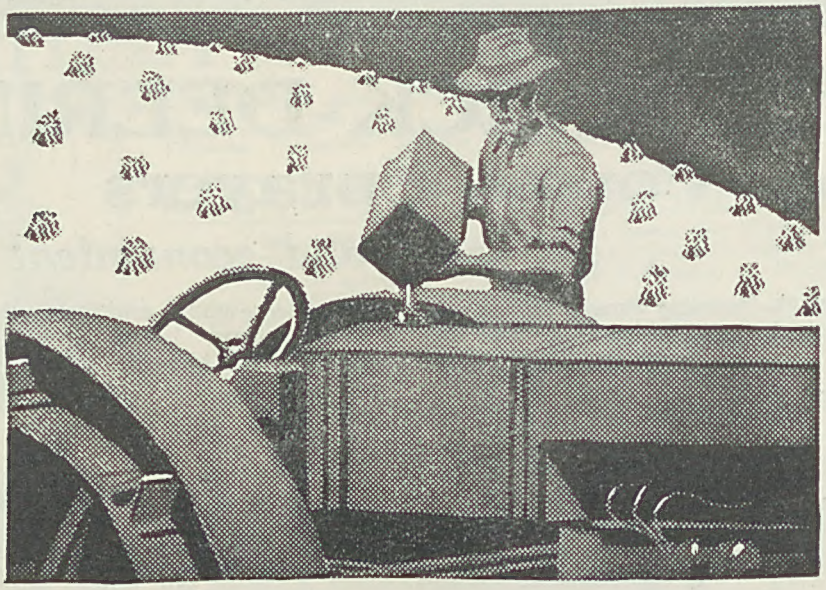

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The Department of Agriculture

Its Importance to the State

An address by Mr. H. A. Mullett, B.Agr.Sc., Director of Agriculture, at the 34th Annual Convention of the Chamber of Agriculture, at Mildura, March, 1936

I SHOULD like to spend a little time in reviewing agriculture as a national enterprise so as to illustrate how the Department of Agriculture acts as a co-ordinating and regulating organization, and how it aids the industry in research and advisory services.

The State is too big, the holdings too scattered, the products too many and of too great a volume to be readily focussed in the mind's eye, and that is why it is a little difficult to conceive agriculture as a single industry. But let us look at the State through the reverse end of a telescope, and imagine that the holdings of the 78,000 producers are concentrated on one farm under one management. Then the cultivation paddocks would be 7¾ million acres in extent and would include 2,400,000 acres of wheat as well as large areas of oats, barley, and fallow. There would be an orchard of 116,000 acres, a potato field of 70,000 acres, 14,000 acres of peas, 9,000 acres of tobacco, etc. On the 31,000,000 acres of pasture paddocks would be 17,000,000 sheep, 910,000 dairy cows, 1,000,000 other cattle, and 361,000 horses. Somewhere on the property there would be 240,000 pigs, to say nothing of 6,000,000 head of poultry.

Adjacent to the dairy paddock would be 162 butter and cheese factories. The farm would produce £50,000,000 worth of produce annually. Half of that produce would be exported and that half would comprise in value 90 per cent. of the State's overseas exports. It would be a colossal business enterprise with many problems, including not only problems of internal organization but also problems of marketing at competitive prices on the world's markets. The farm would have to cope with droughts floods, storm damage, plant and animal diseases. Cool storage would have to be found for perishable products like butter, fruit, and meat. It would have its own grain elevators.

Naturally there would have to be a strong and efficient central authority, but that authority could not hope from a head office in Melbourne to direct the practical operation over such a vast area as that enclosed within boundary fences hundreds of miles apart. That work would have to be delegated to local managers, who would be responsible for the local farm operations. These managers would be subject to the general policy of the central administration, just as local stock and station agents are subject to the laws and policy of their central office, or, say, the lamb buyers who are subject to prices for grades fixed by the Melbourne office of the exporting firm. Besides deciding the general rules of policy for individual local managers, the organization would not expect the local practical men to solve difficult questions of disease control in animals or plants, nor to breed their own wheat or to act as chemists and experts in manuring and pasture improvement. That work would be delegated to an expert staff. In addition,

the organization would have marketing officers to handle the marketing problems, and inspectors to see that the products were marketed in uniform standard packages appropriate to the crop and that the goods were up to standard. There would be also special officers to see that goods bought by the organization were up to the standard required, and that, for example, the seeds sown were true to type and free from disease, and so on.

However, instead of such a homogeneous unit with all the employees subject to a central authority, we have in fact 78,000 independent farm units, each with a separate boss and all struggling between themselves and with other similar units on the other side of the world for a share in the market, all selling their goods independently of each other, and all buying their requirements likewise. If there were a necessity for a central co-ordinating, regulating, and advisory authority, under conditions where all farming in the State was managed by one authority, it should be obvious that there is a still greater need for a parallel organization where every manager is a free agent. Indeed, the problem of co-ordinating the work of the free agents and of advising them is, in some ways, more complex than if they were merely people who could be instructed to do what was required of them. The central co-ordinating authority in agriculture in this State is the Department of Agriculture and its associated Boards; its functions are parallel to those of the supposititious company I have postulated. Those functions are of several types—regulatory, research, investigational, and advisory.

Regulatory Functions.

In recent years the world has entered an era of regulation of industry. The average citizen is apt to regard the farmer as the outstanding example of independence and freedom of action in industry, and strangely enough there are still farmers of that point of view. The proposition was perhaps true before the slump, but it is not so now, and the tendency in this country, and indeed all over the world, is towards greater regulation of industry.

The declared policy of many countries is economic self-sufficiency. Each is straining to produce within its own boundaries all its needs. As a result many long-established foreign markets have been closed to us, and in, addition, the British market has been flooded to saturation point until Britain, to protect her own farmers, was forced to adopt a restrictive import policy. To-day the flow of butter and meat into Britain is being steadily if quietly regulated. Our wheat has been practically unsaleable in the United Kingdom, and the wheat-growing industry here would have crashed had it not been for the fact that the lower prices brought greatly increased sales in the East. Whereas ten years ago the East took 15 per cent. of Victoria's wheat, it now takes an average of 70 per cent. Last year it took 91.8 per cent. of the total quantity of wheat exported.

So far actual restriction of production has been avoided, but unless Australia is able to secure an expanding share of the British market at the expense of the foreign competitor, especially in regard to meat and butter, further expansion of Australia's agriculture may be at the expense of the present producers. It would seem that the era of "every man for himself" has gone in world agriculture, and one of control and regulation of the industry has taken its place. Farmers are by nature individualists, and detest control, but during the past three years rural organizations have requested and obtained many important control measures.

It must be realized, however, that the benefits of these measures cannot be obtained without some irksome restrictions. The Milk Board Act, for example, fixes the prices paid to producers by retailers of milk sold for human consumption in the metropolis. That would seem to be a comparatively simple proposition, but it must be remembered that where a higher price is paid to any section of people producing the same article, there will be a keen struggle to secure the higher price, and some will be forced out of a market that is strictly limited. It is that struggle that tends to break the fixed price and comprehensive control measures such as inspection of books and records, the furnishing of returns, a system of approved contracts and of heavy penalties for breaches of the Act are inevitable.

The Dairy Products Act is another of the same type. It was desired to give to the producers of butter in Australia a price higher than export parity for the same article. For a time the voluntary arrangement known as the Paterson Plan was successful, but only so long as all butter factories and farmers were willing to be bound by the arrangement. In the end, to stop breakaways, legislation was found necessary. This took the form of the

A Victorian dairy herd.

Dairy Products Acts in the States with a complementary Commonwealth Act. As a consequence you have control of the industry, in which both the factory and the farmer who manufactures butter are required to comply with uniform quota systems for local and for export sales respectively. Sister to it you have an unofficial system of price equalization, i.e., sharing equally the increased returns derived from local sales and the decreased return from overseas sales.

In the Grain Elevators Act a means has been devised whereby the wheat grower's costs of production are to be reduced but, as a financial safeguard, partial compulsory use of the system had to be insisted on. Again, in the case of the Marketing Act, machinery is provided under which the growers of any commodity may elect a Board to market the commodity on behalf of all the growers. In this case the commodity is compulsorily acquired in the legal sense and the Board has very complete powers of regulation and control.

In all of these cases the Acts provide that the producers shall be represented on the respective Boards, and in the case of the Marketing Board and the Dairy Products Board, there is majority representation. In respect of the whole of the other fourteen Acts enacted during the past three years, most of which regulate various phases of the industry, or persons interested in the sale of goods to the industry, the Department of Agriculture itself carries out the work.

In all, 37 Acts are administered by the Department of Agriculture and the related Boards and councils. A glance at a list of those Acts will show the wide range of matters dealt with and convince any one of the extent to which the industry is regulated. Much of the regulation has been in force for many years, and is concerned with matters such as public and animal health, control of the quality of the commodities used by farmers, etc.

The *Dried Fruits Act* 1928 ushered in economic control of the industry. Similar control has since been extended to milk and butter, and there is now available machinery under which producers of any section of the industry may control the marketing of their produce.

Research and Advisory Functions.

So much attention in recent years has been focussed upon legislative enactments for the alleviation of distress in sections of the industry that the importance of efficient investigational and advisory services has been rather

overshadowed. No country in the world ever became prosperous solely by taking legal steps. It is true that wise laws can tend to promote more national wealth, but in the main they regulate its distribution as between the various industries and individuals.

This country met the slump in world prices perhaps better than any other country in the world—a fact for which legislative achievements in the last three years must be given due credit. But so far as our troubles arose out of the condition of the overseas markets, we were helpless. We could not legislate ourselves out of those difficulties. Many factors have contributed to our present internal position, but from an external point of view our capacity to pay our way was dependent upon the maintenance of the value of our exportable surplus of agricultural commodities.

The world could not absorb what wheat and wool it had, so farmers concentrated upon the production of butter and of lamb, in which commodities—thanks to the Ottawa Agreement—the foreigner suffered the necessary corresponding restriction on the United Kingdom market. The production of butter increased at a rate greater than any in the history of the State, and, comparing the three years 1927-28, 1929-30, prior to the slump, with the three years ending 1934-35, the butter exports increased from an average of 38,000,000 lb. to 88,000,000 lb., i.e., by more than 130 per cent. Over a corresponding period, lamb and mutton (principally lamb) exports increased from an average of 1.5 million carcasses to 3.25 million carcasses, an increase of more than 100 per cent.

It is, of course, true that some of this butter and some of these lambs were produced on wheat farms, on land which formerly grew wheat, but the production of by far the greatest proportion of both commodities was made possible by the putting into practice of improved pasture management methods worked out previously in the Department's experimental fields. About one million acres were being top-dressed before the slump, but this area has rapidly increased by one and a half million acres by 1935, while the area of sown pastures has increased by a million acres. Without the possession of this knowledge of how to increase the carrying capacity of our pasture lands cheaply the State's capacity to meet the slump would have been greatly restricted. Nor must we overlook the great benefits which have been derived by dairy farmers from the scientific culling out of low-yielding cows, nor the part played by the herd-testing movement in that regard. There has been a steady increase in the production of dairy cows under herd test. In 1928-29, 63,000 cows gave an average yield of 223 lb. of butter-fat; last year 79,000 cows averaged 244 lb. of butter-fat, an increase of 21 lb. butter-fat per head. The Leongatha Association commenced testing in 1925 with an average yield of 147 lb. butter-fat. Last year this association averaged 265 lb. butter-fat. Geelong commenced in 1933 with an average of 146 lb. butter-fat. Last year the 524 cows tested by that association averaged 260 lb. These figures indicate clearly the part played by the research and advisory services in assisting farmers to meet the slump.

An important phase of the Department's work is concerned with the cool storage of fruit. Careful study has revealed the conditions under which it is advisable to pick and store fruit. The knowledge so gained has enabled the quality of apples exported to be greatly improved, and in the case of pears has

Victorian butter being shipped to the United Kingdom.

An aerial view of portion of the State Research Farm, Werribee.

enabled the pear export trade to be placed on a sound basis. Prior to the slump, the export of pears was very small, because the pears would not carry sufficiently well. By picking the fruit at the right time, and pre-cooling it, the industry is rapidly expanding, and last year the export reached 144,000 cases. An export trade in plums is being built up on corresponding lines.

It is not my purpose to weary you with a lengthy list of instances where the Departmental experts have been able to assist industry, but merely to establish the fact that the research and investigation conducted by the Department are of the greatest importance to the State when a national emergency had to be met, and that they played their part as well as the very effective legislative enactments for agriculture.

To-day the problems encountered by the grower and by the Department are greater than ever before, because farming is more diversified than previously, because it is more competitive than ever it was, and because it has been realized that the quality of the product is what sells it, both at home and abroad.

And there is the broader long range national question of increasing the rural population in this State now that there is so little good land still to settle, and the end of our irrigation resources can be clearly seen. Victoria is the most closely settled State in the Commonwealth, and we are left with the difficult marginal lands only unsettled. At present price levels we are within measurable distance of having reached the limit of our productive capacity, and 100 years after settlement of the State began definitely face the position reached by many European countries centuries ago. Unless we can find some means of further exploiting our resources, progress will almost be dependent almost solely upon increases in the consuming population, and that sort of progress is slow. If prices increased abroad, we could bite into the marginal lands, only to be forced from them when world price levels recede. Victoria and South Australia are the only States in Australia in that position, and it is a position that should give thinking citizens food for thought.

It is my view that the rate of increase in the rural population and the limit of production is entirely dependent upon the extent to which, by research and investigation, we can discover methods of improving production and solving the problems that arise in the industry. It is my considered opinion that by means of such research the production of the whole State could be trebled inside 30 years, and the rural population correspondingly increased. Can we not all recognize that as a means of increasing the rural population the two great national policies of the past are reaching their limit, or nearly so, so far as our present knowledge

goes? I refer to the settlement of new agricultural lands and to fresh irrigation projects, and, if so, is it not time that the only possible land settlement policy left to the State, viz., agricultural research, agricultural investigation, with the complementary advisory services, should be put on a footing commensurate with the importance of the work to the State.

South Australia has already tackled the job, and the splendidly endowed and equipped Waite Institute is an example of the way private citizens and the State are prepared to back this policy in South Australia.

The broad scope of the work required is—

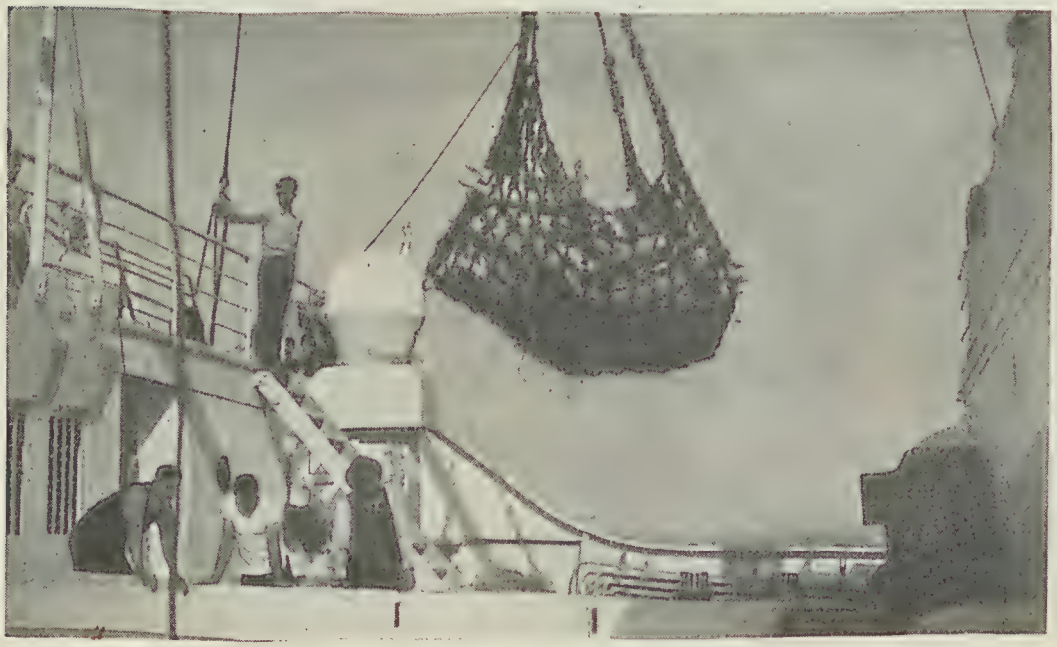
(1) to properly serve the existing rural industry with technical research and advisory services;

(2) to tackle the longer range problems of increasing the rural population by exploiting our national resources, including the problem of the settlement of our marginal lands. Such a policy, if embarked upon, would take years to fructify, but the facts should be patiently ascertained so that we should be ready to undertake a forward rural development policy when the world position justifies that course.

Immediate Problems.

An intermediate and pressing requirement is for an adequate veterinary advisory service. The stock raisers' problems during the past four years have been manifold. There is heavy sheep mortality from Black Disease, *Entero toxaemia,* fluke, and other internal parasites. Blackleg, contagious abortion, and mastitis are responsible for serious loss in cattle and in their productive capacity. In poultry, fowl pox and nutritional diseases have taken their toll. The control measures for many of these diseases have been worked out, but until the veterinary services of the Department and the number of private practitioners are adequate to cope with the work of advising the farmer, the losses will continue.

Another pressing problem is the improvement in the quality of our butter. During recent years the quality was declining to such an extent as to give rise to the fear that a serious rot had set in on the farms and factories. In 1934-35 the percentage of butter graded choicest for export had fallen to 40 per cent., although the corresponding percentage for New South Wales was 84.5. This decline caused the Department considerable concern, as it was a certain indication that slovenly methods in regard to the care of cream on farms and its manufacture in the factories were becoming



Loading Victorian lamb for London.

The Maffra beet sugar factory—one of the successful business enterprises conducted by the Department of Agriculture.

increasingly general, and we were well on the road to losing a reputation abroad patiently built up by years of care and industry.

The Dairying Division of the Department was brought into being especially to meet this position, and the staff and methods re-organized. This has produced immediate results, and I am pleased to be able to say that the percentages of choicest exported last year were—New South Wales 79.4 per cent., and Victoria 61.8 per cent. But much still remains to be done in the way of quality improvement, both in factory and farm, and there are many technical problems in the industry awaiting solution and much further information to be put into practice.

In cereals, the increased demand for higher quality in wheat has to be met, and expert plant breeders are concentrated on that work. New equipment is being provided for the milling and baking tests, towards which the industry itself is generously subscribing. The general quality of the harvest last year was a marked improvement over previous years, but the Department would like to see an arrangement concluded with the trade and the farmers under which more premium wheat would be grown.

The Department's pasture improvement policy has been outstandingly successful, but so far it has been found impossible to include in the work the districts north of the Divide other than the irrigation areas.

Arising out of the breeding work at Burnley, there has been a development of the local trade in grass seeds. The Department has approved of nearly 10,000 acres of rye-grass as of the high yielding perennial strain, and this year has been instrumental in the placing of a new strain of high quality subterranean clover on the market. The Seeds Act gives the Minister power to approve of schemes under which this and similar *élite* seeds will be certified by the Department as of the requisite strain, and it also will place the farmer in a position under which he will be sure that the seeds he buys are free from impurities and of a satisfactory germinating capacity and true to name.

Many problems of plant disease due to fungus and insect pest are still taking toll of the crops. Outstanding among these are Flag-smut and Takeall of wheat, virus diseases of potatoes, Codlin Moth of apples and pears, and Lucerne Flea, also Blue Mould of tobacco. This last has been largely solved by the discovery of the benzol treatment of seedlings, while Bacterial Blight of beans has been minimized by the discovery by the Department of a blight-resistant strain. The remedy for virus disease of potatoes is known, but it still remains to get the industry to adopt the cure by using virus-free seed.

The Department's work cannot be done without expenditure, but the net cost to the State is really very modest, and last year was £67,000. If direct subsidies to the producer for herd testing, cost of handling to producers, Commonwealth subsidies, &c., are deducted, the net cost last year was £35,000. The total expenditure by the Department for the year was £340,871. The bulk of this was on the profit-earning Maffra factory (£135,000), and on the Victoria Dock cool stores (£27,400). Both of these enterprises earned a profit last year. The total revenue of the Department was £290,757.

Irrigation at Boort

Lucerne and Pastures Competition

Report of the Judge—A. Morgan, B.Agr.Sc., Irrigation Field Officer, State Research Farm, Werribee

INCLUDING exhibits in three sections—lucerne, permanent pasture, and summer forages—the competition conducted by the Boort Agricultural and Pastoral Society provided a particularly interesting insight into the varied activities of the district and the rapid strides being made in regard to the efficient utilization of irrigation water.

The comparatively large holdings at Boort are a disadvantage in that progress in regard to irrigation has been delayed to some extent by the absence of an urgent necessity for intensive methods such as are essential on closer settlement areas; on the other hand, farmers who have realized the advantages of irrigation projects have been able to make careful selection of sites for the purpose, and the results achieved have reflected the soundness of their discrimination.

The thought and observation brought to bear have resulted in the avoidance of the mistakes made in earlier ventures in other areas, particularly in regard to the preparation of the ground for sowing and for watering lucerne.

To the best knowledge of those who inspected the various exhibits, the oldest lucerne stand in the district was one sown fourteen years ago. It is a happy omen for the general success of lucerne-growing in the district that this area is still growing vigorously and is very free of weeds. It seems reasonable to suppose that stands sown on areas prepared in accordance with the best modern practices will be even more satisfactory in regard to persistency and productivity, especially now that the benefits of phosphatic manuring are almost universally recognized. Other stands of up to four years old, on varying soil types and in heavy production, further strengthen this view. During the last five years the area under lucerne in the district has trebled.

In one or two instances the bays were too long or too wide in relation to the soil type and the fall. Economy of water is particularly important in the district at the present time, and will be more so as the area under lucerne further expands, not so much from the cost point of view as from the possibility of shortage during peak watering periods. The general opinion was that the soil took about 6 inches at each watering, and in two instances, one on a silty soil with a good fall, and the other on much flatter heavy black land, this was known with certainty. Frequent waterings of this amount have been shown at Werribee to result in thinning out and decreasing yields, while waterings of 4 inches maintained a high annual production of approximately 106 cwt. of hay per acre when topdressed annually with 2 cwt. of superphosphate. The use of long bays on porous soils results in heavier watering than necessary, and bays of a width greater than 44 feet usually result in uneven watering.

The number of waterings given during the season also has an important bearing on productivity. Prolonged tests have established that about 2 feet of water per year is the optimum amount to use, and applied in six waterings of 4 inches this amount gives substantially better yields of hay than when applied as four waterings of 6 inches.

Around Boort, where the first growth usually is cut for hay and the successive growths are grazed off because of the drying off of natural pasture and sown annual pastures, these points are perhaps not so apparent to growers as in districts where lucerne is grown for hay alone.

Other points of interest are the practices of sowing lucerne with a cover crop, and with pasture species, the latter being introduced with the idea of improving winter carrying capacity. Although successful results in many cases may attend the former practice it is to be discouraged because in an equal number of cases the principle involved is not clearly understood, and bad results are obtained. For example, feeding off oats under wet conditions may pug the ground so badly as to spoil the lucerne. Further, if allowed to go to hay, there is a risk of smothering a large percentage

of the young lucerne, and later the withholding of water on account of hay-making may also take toll of the plants. Considering the expense of preparation and establishment, and the length of time for which lucerne will remain productive, it is a false economy to risk thinning by sowing otherwise than as a pure stand, after thorough grading and banking, on a well-prepared seed-bed.

The sowing of winter-growers such as subterranean clover is also not favoured. A good dense growth of lucerne chokes out annuals and weeds, so that if these plants grow vigorously among lucerne it is a reliable indication that the lucerne is not being kept in a vigorous condition by adequate watering and manuring. Increased topdressing with superphosphate is a sure method of increasing the growth of lucerne *both in summer and in winter,* and is recommended for increasing the winter grazing in preference to the admixture of the winter-growing annuals. It must be regarded as significant that when well-cared-for stands eventually thin out, the replacement is by a perennial—white clover—and that the prevalence of subterranean clover in lucerne and permanent pasture is an indication of either insufficient or infrequent watering, or of impoverishment due to inadequate topdressing. The continual feeding-off of lucerne in association with such species, when accompanied by the infrequent watering and light manuring which fosters them, reduces it finally to an annual pasture comparable with one of Wimmera rye-grass and subterranean clover. The sowing of such species should be restricted to places where it is known that water lies and causes thinning, e.g., at the ends of the bays.

Lucerne Exhibits.

Mr. L. E. Weaver's exhibit in the competition for the best 5 acres of lucerne was in first-class condition at the time of inspection, and the lay-out showed the careful attention to detail which lucerne, in view of its lengthy period of usefulness, merits. It was sown on heavy black land on the 25th April last year at the rate of 8 lb. lucerne, 1 lb. perennial rye-grass, and ½ lb. subterranean clover per acre, with 100 lb. superphosphate, and had been watered during the first week of February after the second cut. The first cut had been made in early December, after which 750 sheep were turned in on the total area of 30 acres for ten days. The paddock was then watered. The

Portion of Mr. Weaver's winning lucerne exhibit.

water used for the second irrigation was just under the 6 inches, which appears to be the common figure for the district. Bays shorter than 10 chains are indicated as being more economical in regard to watering under these conditions.

The exhibit was free from weed growth, and is a tribute to the value of thorough preparation before sowing. In order to cope with saffron thistle, the paddock was fallowed and worked, then watered, to bring on the thistles, cultivated, and then sown on practically clean ground. It was then harrowed and rolled. Although lucerne encouraged by watering and manuring will effectively deal with saffron thistle in the course of a few years, there is nothing so satisfactory as giving it a serious setback before putting in the lucerne.

The lucerne was just about the "one-tenth in bloom" stage at which tests have shown it

Table I.—Details of the Award—Best 5 Acres of Lucerne.

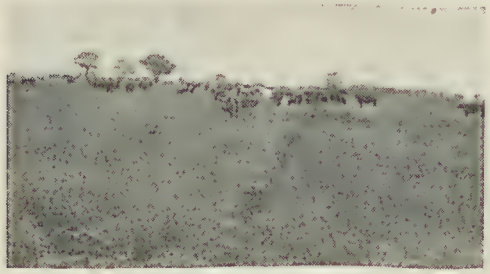
Exhibitor.	Lay-out of Land for Irrigation.	Quality of Hay it would Produce.	Apparent Yield.	Uniformity.	Freedom from Weeds.	Total.
	20	20	20	20	20	100
1. L. E. Weaver ..	19	19	19½	17½	19½	94½
2. V. H. Lanyon	18½	19	16	18½	19	91
3. A. N. Lanyon	16½	18½	17	17½	19½	89
4. D. Lanyon ..	16	17½	17	16½	19½	87½
5. J. D. Fyfe and Sons ..	17	12½	14	16½	19	79
6. R. J. Lanyon ..	5*	17½	8	19	19½	69

* Not checkbanked.

to give the maximum yield for the season in addition to being of high quality.

The second prize exhibit—that of Mr. V. H. Lanyon—although favorably situated as regards soil and the topography of the area, merits high commendation. The water supply in this case is obtained by pumping from Lake Leaghur, and the soil is a silty loam of a very porous character, not subject to cracking as in the case of the black land to which it slopes down for 15 to 20 chains. The steep slope enabled the use of bays of this length, and narrow bays were also employed as a compensating factor. The method of sowing, although it gave satisfactory results in this particular instance, is not recommended for general adoption. Sowing was done in April, 1935, with 10 lb. lucerene, 40 lb. oats, and 90 lb. superphosphate. The oats yielded more than 2 tons to the acre, and although the establishment generally was good, in a few patches the oats were so dense that the lucerne was thinned out badly. These patches remain as mute evidence of the inadvisability of attempting to reconcile the conflicting interests of two crops in association. For all that, it must be conceded that the exhibit was an excellent one and in such a favorable location should last for many years, particularly as Mr. Lanyon is at present considering the possibilities of heavier topdressing.

Third place was filled by Mr. A. N. Lanyon's selection, situated in an 11-acre field sown in April, 1932, on heavy black ground with 10 lb. lucerne with 80 to 90 lb. superphosphate. This has been topdressed with up to 1 cwt. per acre each year since, and the usual practice is to use it for grazing, as part of a rotational scheme in conjunction with three other similar fields, after the first cut each season. Although this exhibit lost points for quality on account of having reached the early seeding stage, in respect of yield, uniformity, and freedom from weeds it scored well, and had the judging taken place a little earlier would have been difficult to excel. The general condition of the area was more noteworthy in view or some undesirable features of the location, and also its age in comparison with some of the other stands.



Cows grazing on irrigated lucerne in the Boort district.

Permanent Pastures.

Great interest is being taken in the possibilities of permanent pasture, and there is no doubt that such pastures can be satisfactorily established in the district. The problem of maintenance is not so easy of solution, however, and under the conditions of water supply obtaining at the present time any large-scale establishment of permanent pasture would seem to be inadvisable. Experience in lucerne-growing is of great value in regard to pastures, but the penalty for inadequate watering is more severe in the latter case. Perennial rye-grass, cocksfoot, and white clover require frequent watering during the summer months—in some cases watering every ten days is required. Further, good management demands subdivision into areas the smallness of which will not appeal to those accustomed to the management of large holdings. Exhibitors showed their appreciation of the watering problem by the inclusion of a high proportion of lucerne as compared with the following mixture, which, with certain variations according to districts, is the one recommended by the Department.

	lb.
Perennial rye-grass (N.Z.) (Hawke's Bay or Colac) ..	10 (or 12)
Cocksfoot (Akaroa or Victorian)	5 (or 3)
White clover (N.Z. certified) ..	1-2
Alsike	1-2
Perennial red clover (Cow-grass)	1-2
Subterranean clover ..	1-2
Strawberry clover	¼
and if required—	
Prairie grass or lucerne ..	1-2

The above mixture is quite successful with considerable variations in the amounts of the various species. Italian rye-grass may be included (up to 3 lb.), but should be regarded with caution on country where a luxuriant growth is likely to cause a smothering effect

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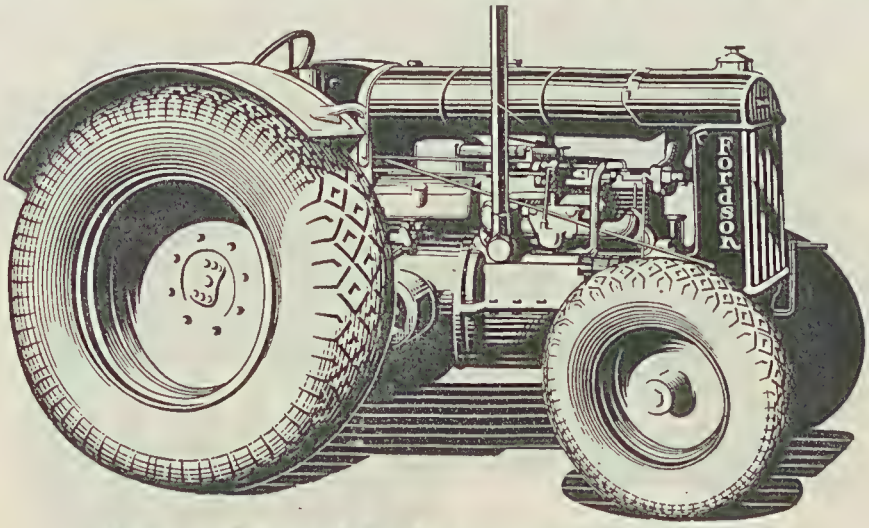

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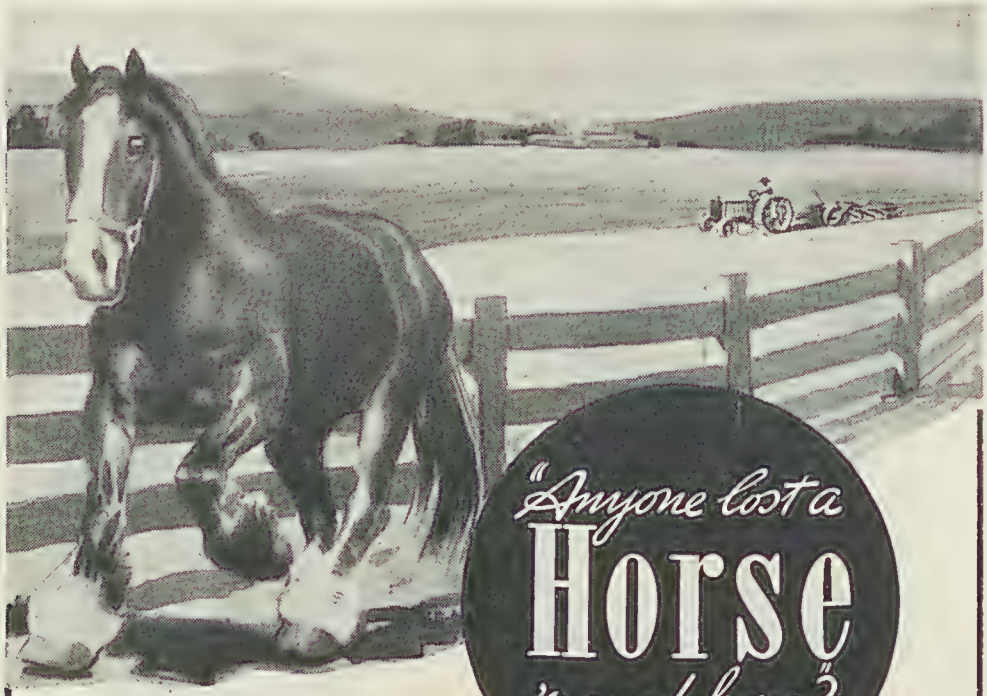

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if the conditions for feeding it off are unsuitable. With ordinary management the Italian rye-grass, alsike, cowgrass, and lucerne sink into insignificance in a few years, but before this occurs they have fulfilled their purpose of providing a bulk of feed in the early years. Management is the main factor in this, as they remain much longer in the sward when grazing is not severe. Subterranean clover should never assume major importance in the sward if watering is sufficiently frequent during the summer to maintain white clover as a strong competitor, and, of course, the annual topdressing of not less than 2 cwt. superphosphate is an equally important requisite.

As previously emphasized, caution is recommended in regard to these pastures because of the conditions of water supply now prevailing, and a combination of lucerne with Wimmera rye-grass-subterranean clover pasture, which usually requires only two waterings, is to be preferred at present.

DETAILS OF AWARD—BEST 5 ACRES OF PERMANENT PASTURE.

Exhibitor.	Lay-out.	Condition.	Uniformity.	Mixture.	Freedom from Weeds.	Total.
	20	20	20	20	20	100
1. J. D. Fyfe and Son (2) ..	18	18	18	18	18½	90½
2. H. Sutton ..	18	17	17	17½	15½	85½
3. J. D. Fyfe and Son (1) ..	18	17½	16½	15	17½	84½

Messrs. J. D. Fyfe and Sons winning pasture was strongly lucerne-dominant. Although all other species were represented in fair proportion in this young pasture, they were hampered by infrequent watering, and the strong germination of subterranean clover was also a reflex of this.

Summer Forages.

Considering the fact that summer forage crops are extensively grown in the district, the number of entries in this section was disappointing, though the paucity of entries probably was due to the fact that these crops in most cases had gone past their best stage, and owners were disinclined to exhibit. The more progressive view was held by the lucerne growers, who, while admitting in some cases that their exhibits could not be held at their best for the judging, were anxious to join in for the benefit of the free interchange of ideas and observation of varying methods employed.

A dense growth of Sudan grass at Boort grown under irrigation.

DETAILS OF THE AWARD—BEST 5 ACRES OF SUMMER FORAGE.

Exhibitor.	Quality.	Apparent Yield.	Uniformity.	Freedom from Weeds.	Total.
	20	20	20	20	80
1. J. Walker, No. 2, Sudan grass ..	14½	18½	19	19½	71½
2. J. Walker, No. 1, Sudan grass ..	14	18	19½	19½	71
3. C. Kirk, Ambercane	15	18	18	19½	70½
4. E. Boyle, Japanese Millet	12	18	18	19½	67½

Mr. J. Walker's exhibits were portions of a 19-acre field of Sudan grass sown in early November with 12 lb. seed and ½ cwt. superphosphate on well-prepared ground. It was watered at the end of November, but no water was available later. Through unfortunate circumstances it was allowed to go past a good feeding off and hay stage, and is now to be cut for seed. In connexion with the ambercane, it would seem that considerable waste could be avoided by making silage. More liberal manuring is also indicated as a forward move.

Pasture Investigations

Results of Trials

Fourth Annual Report of the Experimental Pasture Work conducted by the Department of Agriculture under arrangement with the Victorian Pasture Improvement League.

THE experimental work conducted by the Department of Agriculture for the Victorian Pasture Improvement League was commenced in 1932, and a record of the work during the first three years is to be found in the first three annual reports issued early in 1933-4-5, the latter two of which were published in the *Journals of Agriculture* for April and May of 1934 and 1935, respectively.

The following report covers the progress of the work during the fourth year of the operations, and gives an account of the extensions which were made to the programme during the autumn and winter of the past year. With the exception of the Yarragon and Childers plots, which were discontinued early last year, the original 45 experimental areas, established in southern Victoria in 1932, have been continued.

The results obtained during the past year were valuable, inasmuch as they served to confirm those recorded in the earlier years, and, in addition, some outstanding responses to potash were obtained on plots which previously had not shown any benefit from this fertilizer. A considerable increase in the work of handling the system of plots was occasioned by the extensions which were made last year. These involve six new mowing plots at Warragul and Mirboo North, in Gippsland; and six at Larpent and Cobden, in the Western District; three pasture establishment trials in the pastoral areas of the Western District, eight observational trials with potash at Larpent and Cobden, and two pasture establishment trial areas in the irrigation districts of Kerang and Swan Hill, in the north. The work in the irrigation districts is dealt with specifically later in this report.

As originally planned, the experimental plots consisted of major plots and pilot plots on which were conducted manurial and species establishment trials. The pilot plots were designed to yield observational records only, but on each major plot an attempt to measure the increased growth resulting from the manurial treatment has been made by means of a mowing trial area, and also by larger plots on which stock were rotationally grazed and records kept of the actual number of grazing days obtained.

Major Plots.

Some of the difficulties experienced with grazing the major plots, all of which are located on private farms, were explained in last year's report, and it was pointed out that the time which the stock spent on each plot did not necessarily give any measure of the feed consumed on each. The main trouble is that the stock eagerly graze the feed on the vigorously growing manured plots, and are reluctant to graze that on the unmanured areas. Thus, differences in growth which were easily seen by eye are not reflected in the grazing records, and it has become abundantly clear that the

grazing records as such are of little value. Where material differences have been obtained as a result of the fertilizer treatment, these plots now show the cumulative effect of the annual dressings, and in many cases the swards on these manured plots are now much denser and more vigorous than those on the unfertilized areas.

On the mowing areas the swards maintained a high level of productivity during the first three years, giving useful and dependable information, although it was recognized that the conditions were hardly normal, as the mown grass was being removed from the area, and no plant food was being returned, except the manures applied. The continued mowing and removal of the produce has apparently resulted in a partial exhaustion of the soil, as indicated by the large increased growth obtained from the potash treatment on some plots, and it is to be expected that from now on the growth on these plots should rapidly decline.

On the sown down areas the swards have become well established, and they furnish useful information on the relative persistency of the various species for the conditions under which they are growing. The weeds, which were troublesome on these areas during the establishment period, have largely disappeared, and their place has been taken by less vigorous though more persistent weeds.

Pilot Plots.

While much information has been obtained from the pilot plots on which observational records only are made, it has become apparent that the usefulness of these plots has been restricted by the method of management necessarily imposed on them. Substantial manurial differences can be readily detected, but where the differences are small they are very liable to be masked by the residual effects of previous grazing, particularly where nitrogeneous fertilizers have been applied to some of the strips only. The purpose of the pilot plots was to indicate problems warranting further detailed investigation, and it was not intended that they should be used to measure small differences in pasture growth. It now appears, however, that over a number of years the cumulative effect of some of these small differences may become substantial and profitable.

Weather Conditions During 1935.

Following the prolific spring of 1934, there was a continuance of unusual rains during the summer months, and later favorable autumn growth was obtained. The wet summer period produced an unusually strong growth of white clover on many plots, and cocksfoot, red clover, and paspalum also were encouraged to make good summer growth.

During the winter, the prolonged heavy rains resulted in the ground becoming excessively wet. Pasture growth was severely checked, and, where heavily stocked, paddocks were cut about very badly. The recovery in the early spring was very slow, and after a short flush in early mid-spring growth was quickly checked by a dry spell in November. In both Gippsland and the Western District the amount of grass hay cut was much less than the previous year, but it was carted and stacked under favorable weather conditions.

A pilot plot in the Timboon district.

Botanical Surveys of Plots.

Records of the composition of the swards in the various plots have been made since the work was commenced in 1932, and considerable changes have been observed from both manurial applications and seasonal conditions.

The grass clover balance is largely determined by the stage of growth at which the pasture is kept, and where the pasture is allowed to become tall, and seed late in the spring, the clovers generally are suppressed. The usual result of top-dressing with superphosphate is to increase the proportion of clover in the pasture, and while this is due partly to the actual stimulation of the clover by the superphosphate. it probably is largely due to the fact that the stock keep the top-dressed pasture grazed closely, and this allows the low growing clovers to make more vigorous growth. On soils responsive to nitrogen and potash, these fertilizers can alter the composition of the pasture quickly. Nitrogen encourages the growth of grass, whereas the potash stimulates the clover.

Botanical surveys have revealed marked differences between the swards on the pasture mixture and species trial plots, where it is found that the non-persistent annual species have died out, and only the perennial plants or the vigorous re-seeding annual types survive. The management that the observational plots are subjected to naturally results in the grasses, particularly the tall-growing types, being encouraged, to the detriment of all the more lowly-growing forms, and for this reason cocksfoot, Phalaris, and red clover have probably made better growth than they would have done under normal grazing conditions.

The work has shown that the factors which determine the survival and dominance of the species in a sward are so numerous that it would be impossible to conduct experiments which would meet all the factors liable to be met in any particular locality.

Field Days.

Shortage of staff and the increased work made necessary by the large extension of field work involved in the new mowing plots established last year prevented the holding of field days on the plots during the past spring. Many visits were paid by officers to farmers' properties during the year, and much of the information obtained from the plots has been made known to many farmers by personal contact, correspondence, and published articles.

The weakness of a general pasture field day appears to lie in the fact that results obtained on an experimental plot need not necessarily apply to the particular conditions under which any near-by farmer is working. Pastures are so complex in composition and vigour that it is impossible to describe satisfactorily their various characteristics and limitations, and it is only by actual inspection and discussion of the difficulties on the spot with an experienced officer that the farmer can be correctly advised.

The location of an experimental plot in a district is of great value, but all the pasture problems and difficulties of any locality are far too numerous and variable to be solved by any one experimental plot, and it is only when these problems can be given individual consideration by one experienced in the results of many other plots that useful advice is likely to be obtained by the farmer. The most efficient method of pasture improvement to be adopted will depend as much on the actual nature and condition of the pasture as on the local soil and climatic conditions.

Maintenance of Plots.

The usual manurial treatment was repeated on the major plots during the past season, but, except for a spring dressing of sulphate of ammonia, no further applications were made to the pilot plots. Grazing was continued on the rotational grazing plots as during the first years, but the records of the number of grazing days from each still fail to indicate the extent of the differences between the variously manured pastures. The general pasture growth during the past spring was not as vigorous as usual, and little difficulty was experienced in keeping the growth on these areas in check.

Observations have been made from time to time on the pilot plots which have been fed off at intervals throughout the year. Growth on some of these got beyond the stock at the end of the year, and it was necessary to remove this surplus growth with the Autoscythe.

New mowing manurial areas were established in the Warragul and Mirboo North districts, in Gippsland, and at Larpent and Cobden, in the Western District, during the winter, and the mowing and weighing of these plots commenced early in the spring. Already it appears that in most cases the results from these plots will confirm the rather unexpected results which had previously been obtained on the local major plots, viz., increases from lime plus superphosphate in the Gippsland hill country, and potash in the Western District.

The results from an experimental plot being explained to a field day gathering.

GENERAL SUMMARY OF RESULTS.
(NON-IRRIGATED DISTRICTS).

Manurial Trials.—Mowing (weighed) and Pilot (observation) Plots.

While the annual manurial dressings were repeated on the major plots during the past year, the manurial sections of the pilot plots, except for a spring nitrogen application in the form of sulphate of ammonia, were not given any further treatment, and any responses which they have shown during the past year are a result of the residual effects of dressings applied in the previous years.

The most valuable prolonged response continues to be obtained from superphosphate, but during the past year it has been recorded that, under conditions where superphosphate alone has not shown satisfactory response, lime or potash given in addition frequently has effected a big improvement in pasture growth. The response to nitrogen applied in the early spring usually has been very marked, but the treated plots do not readily recover from the subsequent depressed growth, and its use can be advised only under special circumstances.

On most of the pilot plots and the rotational grazing areas, superphosphate has continued to effect a marked improvement in pasture growth, but, on the mowing manurial trial areas (which are regularly cut with a motor mower, and from which the produce is entirely removed), the potash deficiency which became acute last year has prevented the superphosphate from working to best advantage. In fact, the plots which in the past have been the heaviest producers have suffered most acutely from the potash deficiency.

Superphosphate.

Superphosphate has continued to give its best results during the early spring, and late in the season the actual rate of growth on the treated plots has been little better than that of the unmanured plots. The last cut in the spring season usually has shown a somewhat better growth on the 3-cwt.-per-acre plots than on any of the others, but even here the extra late seasonal growth encouraged by the manure has been only slight, and it would appear that, though the manurial treatment is helpful during the winter, it does not offer any possibility of prolonging pasture growth in the late spring, or encouraging out-of-season growth during the dry summer period.

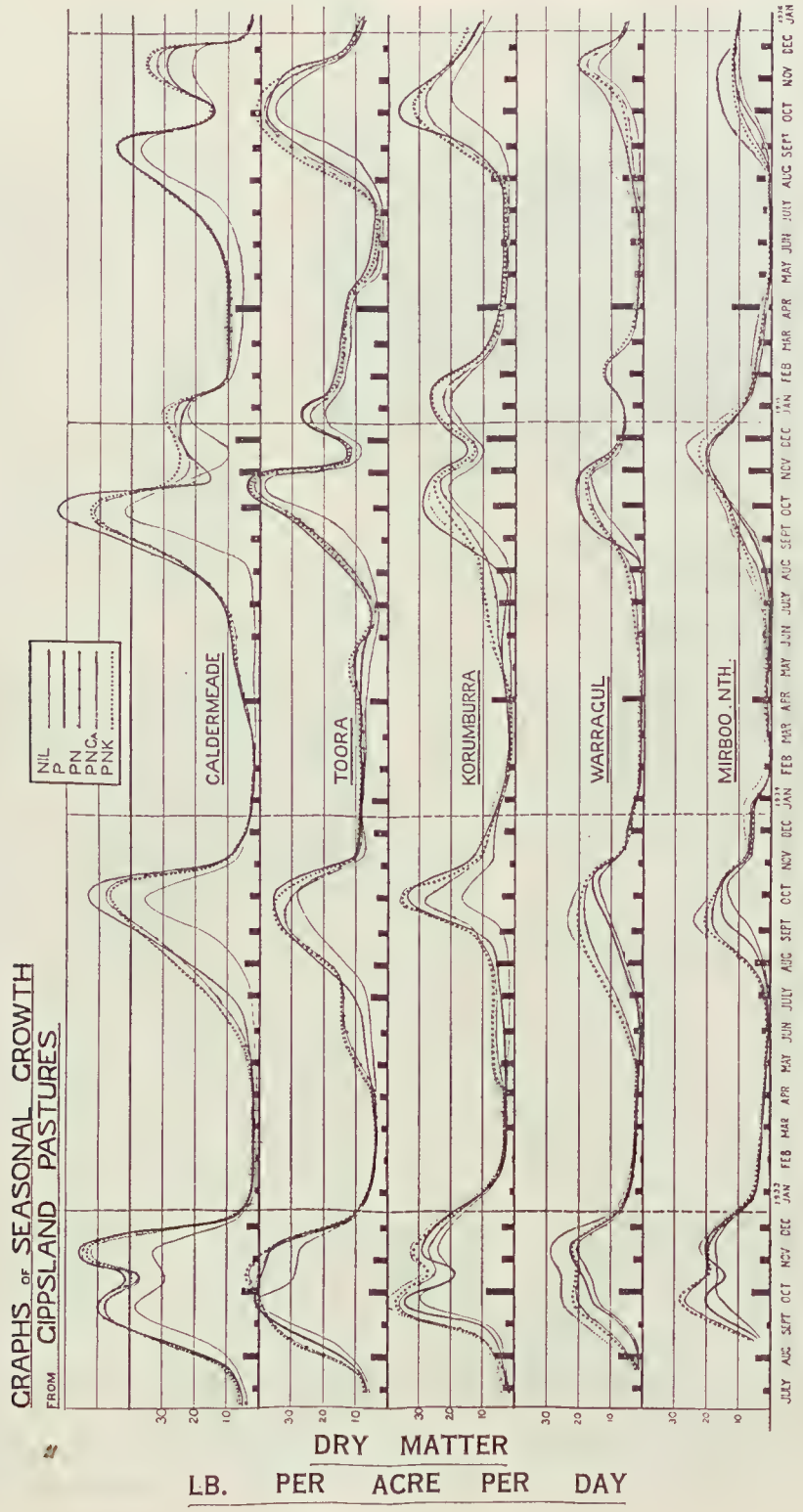
On the rich volcanic areas in the Western Dstrict, particularly at Noorat, Coragulac, and Stoneyford, the plots usually have shown little response to superphosphate, and generally it has been recorded that the poorer the soil the bigger the response. Light sandy loams, as a rule, have given the quickest and most marked response, but the heavier loams and clays have given a more prolonged response, and on them the residual effects have been more pronounced.

The response to superphosphate has been disappointing on the "cocksfoot-red clover" pastures of Gippsland, but subterranean clover and native grass pastures, on similar soils, have responded well. Additional dressings of lime and nitrogen applied to these cocksfoot-red clover pastures have given a good response.

During the past season, new mowing plots were established at Warragul and Mirboo North to determine if these results were applicable to similar soils in these districts. The poor early spring growth which is characteristic of these pastures appears to be largely the result of an acute nitrogen deficiency in the soil at that period, and while it may be temporarily overcome by the use of sulphate of ammonia, this condition is better remedied by the introduction and stimulation of the clover species.

Muriate of Potash.

Previous pasture experiments conducted in this State usually showed little or no benefit



The effect of various manurial treatments on Gippsland pastures.

The above results are for the period, July, 1932, to January, 1936. The manurial dressings indicated in the legend are as follow:—Nil = No Manure; P = superphosphate 2 cwt. p.a.; P.N. = super, 2 cwt. + sulphate of ammonia 1 cwt. p.a.; PNCa = super. 2 cwt. + S. of A. 1 cwt. + lime 1 ton p.a. (1932 only); PNK = super. 2 cwt. + S. of A. 1 cwt. + potash 1 cwt. p.a.

The small black vertical columns indicate the monthly rainfall in inches.

Note the poor growth at Warragul and Mirboo North.

from the use of potash, and it has generally been considered that the soil potash supply has been ample to meet the needs of pasture growth. Unfortunately, the usual method of soil analysis does not appear to distinguish between available and non-available potash in the soil, and, while the total reserves of potash in Victorian soils appear to be large, the quantity that is readily available in many cases apparently is strictly limited.

In the first years of these pasture experiments, potash gave comparatively good results in the mowing plots at Cobden and Larpent, in the Western District. In the third year much larger responses were recorded at both these centres, and there were indications on other plots that some improvement was being effected. During the past year, even greater responses were obtained on most of the mowing plots in the Western District, and, during the early spring, growth on some of the plots was at a complete standstill, except where potash treatment had been given.

While it is possible that the results of the past year may have been partly influenced by the abnormally wet season, the fact that the responses to potash have become progressively greater on the mowing plots each year would suggest that the continued mowing has rapidly exhausted the soil potash supply, and we have quickly reached a condition which would be arrived at much more slowly under ordinary farming conditions. In the Cobden district, the diminishing returns being obtained from superphosphate would suggest that this stage is being approached on many of the farms, and it would seem that so far as the poorer soils of the higher rainfall areas of the Western District are concerned, the duration of their profitable response to top-dressing with superphosphate is likely to be limited by the available potash supply of the soil.

To investigate this matter and to determine the applicability of these results, six new mowing trials, four at Cobden and two at Larpent, were commenced last winter, and from the outset, even without any artificial exhaustion by mowing, most of these plots have shown a response to the potash fertilizer.

Sulphate of Ammonia.

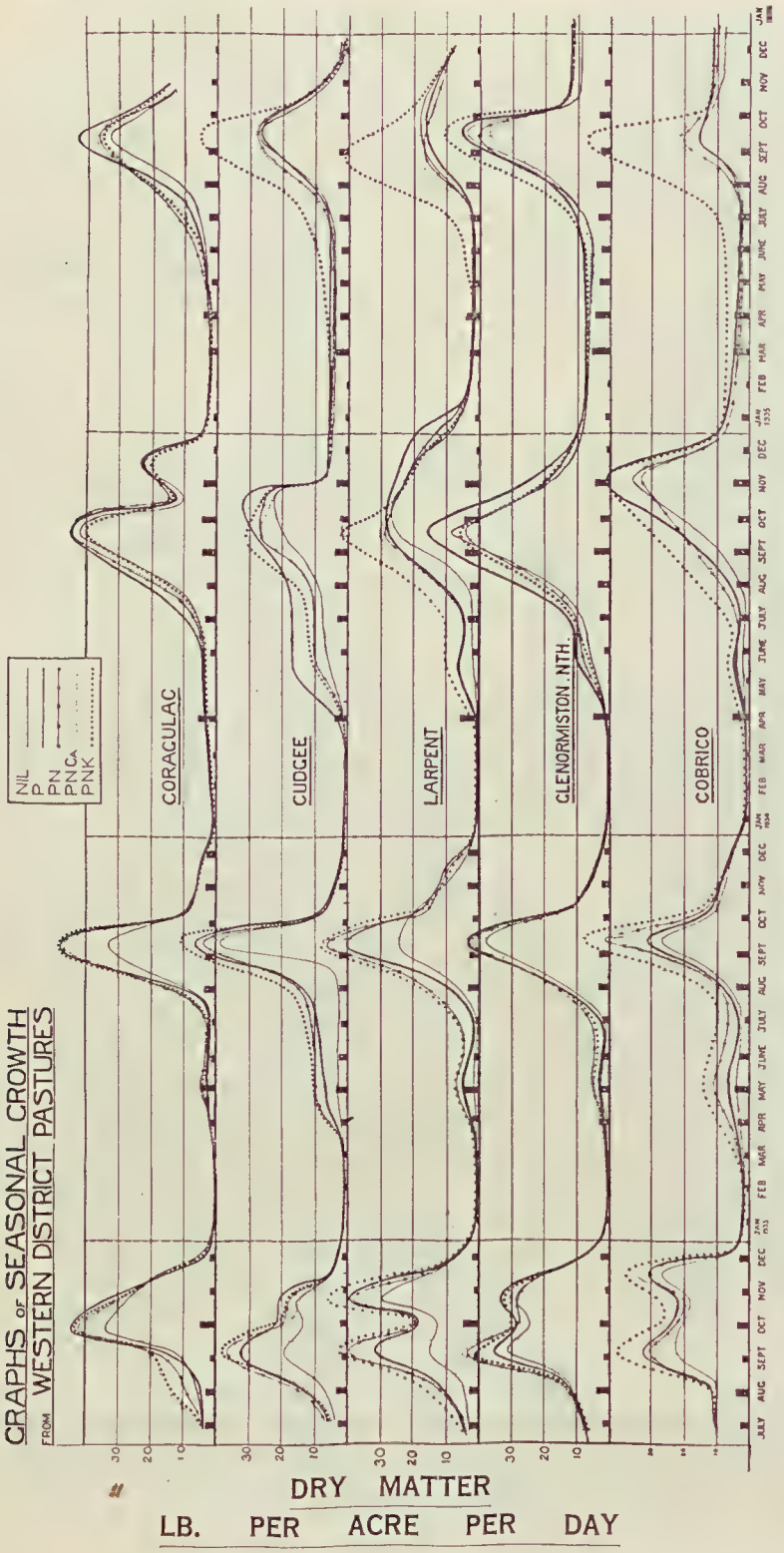
Pasture soils in southern Victoria are almost invariably short of nitrogen during the late winter and early spring periods, but the use of a nitrogeneous fertilizer, in the form of sulphate of ammonia, generally has not been attended by satisfactory results. Where repeated dressings have been applied to the pastures over a number of years, the result has usually been to lower greatly the productivity of the pasture, but there have been instances on heavy soils with pure rye-grass swards where valuable responses to such dressings have been obtained. Sulphate of ammonia has a marked tendency to increase the proportion of grass in the sward, and to reduce the percentage of clover, and on mixed pasture this usually is a serious disadvantage to its use.

Lime.

A dressing of lime at the rate of 1 ton per acre was given to strips in all the plots at the time of their establishment, and while this, as a rule, has not effected any improvement in growth, yet in a few cases it has resulted in a very definite improvement. Generally, the plots in the Western District and on the Gippsland flats have not responded, but on the red hill country of Warragul and Mirboo North lime, when applied together with superphosphate, has greatly improved the sward. More recently, small plots in which lime is being more extensively tested have been established on the Gippsland red hill country. Here, lime in different forms and in varying amounts has been applied on these plots, and already some further responses have been obtained.

The lime trial plot established at Heywood in 1933, following on the good response of the pilot plot in 1932, again failed during the past year to show any increase comparable with that obtained in the first two years.

From time to time objections have been raised to results obtained from lime trials on the grounds that had some different form of lime been used, the results would have been better; but, from the results that have been obtained on these plots it appears that, where pasture land is responsive to lime, it will respond to any of the usual forms of agricultural lime, irrespective of the actual form. In fact, on the Heywood plots it was found that calcium carbonate, even in the form of lime sea sand from the Warrnambool "sand" dunes, appeared to give just as good and quick a response as was obtained with finely ground quick lime. Generally, it appears that, while many of the claims recently made for lime have been grossly exaggerated, there are some pastures in Victoria which benefit materially from its use.



The effect of various manurial treatments on Western District pastures.

(For legend and explanation see page 176. Note the progressive increase due to potash on most of these plots.)

Ground Rock Phosphate.

In the first year of the experiments, a finely ground and roasted rock phosphate, known as Ephos phosphate, was applied to the pilot plots in Gippsland. In the first two years it did not show up favorably in comparison with the superphosphate dressings, but since then it has given relatively good results. While its action on pastures in Gippsland has been slow, it has shown distinctly beneficial results.

Blood and Bone.

Plots treated with this material have shown some improved growth, and, though the response has been inferior to that obtained with superphosphate, the residual response from this material has been well sustained.

Manurial Trials—Rotational Grazing Plots.

On the rotational grazing trials, the responses to fertilizer treatment have been similar to those obtained on the mowing manurial areas, with the exception that the potash deficiency which became acute on the mowing plots last year was not nearly so marked on the grazing areas to which there is a constant return of plant residues in the form of dung, &c. The strips of potash across these grazing plots were very conspicuous at Larpent and Cobden during the past spring, mainly on the "superphosphate 2 cwt." and "superphosphate + lime and nitrogen" plots.

Young stock on rotational grazing plots.

At Mirboo North particularly, but also at Warragul and Korumburra, the pasture on the grazing plots receiving superphosphate + lime + sulphate of ammonia has been improved greatly, and these plots are now much more productive than the areas treated with superphosphate only. As has been indicated earlier in this report, the records of grazing days obtained from these grazing plots are still unsatisfactory, and do not give a true measure of the relative productivity of the various plots.

Pasture Mixtures and Strains Trials.

On the major plots, areas each 2 acres in extent, were sown in the autumn of 1932 to strips of various grass and clover mixtures. In the early period, the annual short-lived species flourished, but now it is the persistent and perennial species only which survive and the place of the short-lived species has been taken by volunteer pasture plants. The plots show the relative persistency of the various species for the particular conditions under which they are growing. As these areas, however, are subjected to intermittent rather than to continuous grazing it is probable that some of the taller-growing species have been favoured for this reason.

Perennial rye-grass (*Lolium perenne*) is the outstanding persistent perennial grass on the improved pastures of southern Victoria, and it has made the bulk of the grass growth on these pasture mixture trials. Sown alone, it frequently has not made satisfactory headway, but where sown on favorable soil in combination with clovers it usually has developed a good dense sward.

Short-lived types of rye, such as *Wimmera* (*L. Hybridum*), *South Island New Zealand* (*Lolium* spp.), *Irish* (*Lolium* spp.), and *Italian* (*L. multiflorum*), all of which were included in these rye-grass persistency trials, have long since died out, and their place has been taken by volunteer species.

Hawke's Bay rye-grass (*L. perenne*), and the local *Victorian strains* of perennial rye-grass obtained from Colac, Gippsland, and the Central District, have all developed dense persistent swards and show no signs of thinning out. The Hawke's Bay is a rather later maturing strain than the Victorian types, and, though it usually does not appear to be any more productive, it has produced rather denser swards on the hill country of Gippsland and on the lighter soils of the Western District.

Cocksfoot (*Dactylus glomerata*), as expected, made strong growth on the Gippsland hill country plots, but it has also made excellent growth on many plots in the Western District. The strong development made by this species may be due partly to the method of grazing to which the plots are subjected, viz., they are fed off at intervals, and allowed to make good growth before being grazed again. Under similar conditions, both Phalaris and red clover occasionally have made good growth, but it is unlikely that they would do so well on these same soils if subjected to close or continuous grazing.

Phalaris (*Phalaris tuberosa*) has made disappointing growth on most plots, but on rich and deep soils, and particularly where the soil normally provides good growing conditions

The Autoscythe cutting dense growth of perennial rye-grass and subterannean clover.

during the winter months, it has grown well, and in some cases has made quite a close sward. On shallow soils or poorer soils where winter growing conditions are not so favorable, Phalaris has made very little headway, and under southern Victorian climatic conditions its area of probable usefulness appears to be strictly limited.

Prairie grass (*Bromus unioloides*) made good growth during the first year on the rich soils and where good winter growing conditions prevailed, but it has not proved to be persistent.

Timothy (*Phleum pratense*), was included in some of the grass mixtures sown, and, though it made slow headway during the first years, it is becoming quite conspicuous on some of the plots. *Crested dogstail* (*Cynosurus cristatus*), which has been persistent on most plots, is becoming aggressive on the poorer soils, but where it is dominant it is very noticeable that the growth on these swards is usually thin and sparse.

Chewings Fescue (*Festuca rubra*) and *Brown Top* (*Agrostis tenuis*) have developed close swards on most plots, even under very unfavorable conditions. Though persistent, neither have made much bulk of growth, and in this respect are somewhat similar to *Kentucky Blue* (*Poa pratensis*), which, in most cases, is persistent, in a few cases aggressive, but rarely productive.

Paspalum (*Paspalum dilatatum*) and *Meadow Foxtail* (*Alopecurus pratensis*) have made satisfactory headway in a few plots only, and *Kikuyu* (*Pennisetum clandestinum*), though established on most plots, has developed only where it encountered very favorable conditions for summer growth.

Yorkshire Fog grass (*Holcus lanatus*) was sown in small plots or strips on all the major and pilot plots in 1932, and made strong headway, but, as a result of the regular manuring of these plots, it has in most cases been overgrown by subterranean clover and rye-grass, and is present in small amount only. Yorkshire fog is one of the commonest grasses in the pastures of southern Victoria, and while it is undoubtedly an inferior plant, it is hardly correct to condemn it as worthless. Allowed to become coarse and mature, and run to seed, stock will not eat it, but grazed short, particularly when growing as a volunteer grass plant in combination with subterranean clover, it contributes far more to the productivity of Victorian pastures than is generally admitted. It responds very quickly to changes of management, thickening badly when the pasture is allowed to go to seed, but with top dressing and close grazing, and in competition with rye-grass and subterranean clover, it is often almost wholly suppressed.

Of the clovers, *Subterranean* (*Trifolium subterraneum*) has been the most successful, and it is to be found making vigorous growth on almost every plot. *White Clover* (*T. repens*) has made good growth on the flats of Gippsland and in some of the wetter parts of the Western District, but on most plots the late spring and summer growing conditions have been too dry for its best development, and generally it has not made nearly as good growth as has the subterranean clover.

Encouraged by the lenient grazing to which these plots are necessarily subjected, *Red Clover* (*T. pratense*) has made very good growth in a number of places. *Strawberry Clover* (*T. fragiferum*), *Alsike* (*T. hybridum*), and *Lucerne* (*Medicage sativa*) in a few instances have made some headway, but in most cases their growth has been disappointing. On some of the wetter plots, *Birds-foot trefoil* (*Lotus corniculatus*, var. *hispidus*) has made good growth; on the Gippsland hill country it has grown well, and is spreading on some plots.

The results of these Pasture Mixture Trials indicate that, while it is necessary to sow persistent productive species, in most cases there is no advantage to be gained from sowing other than simple grass-clover seed mixtures. The mixture, if possible, should include five or six species which are capable of making useful growth in competition with the other constituents of the mixture. A combination of grass and clover seeds should be used, and single species seedings should be avoided. It has been very noticeable that where the pasture has tended to consist of one major species only, the growth has been limited mainly to one short period, and for the rest of the year the pasture has been almost completely at a standstill.

A typical scene in the Warragul district. Note the abundance of shelter.

Results of Major Plots

GIPPSLAND

A summary of the general results obtained from the manurial trials is shown in Tables VI and XII. Details of the earlier results are given in the second and third years' reports published in the April, 1934, and May, 1935, Journals of the Victorian Department of Agriculture.

Each major plot manurial trial mowing area is 0.4 acre in extent, the treated strips being 80 feet long and 4 ft. 6 in. wide. Each treatment is replicated six times, and the figures in the following tables, showing the yields of greenstuff, are the mean of the six replicates. The produce is cut with a motor grass mower, usually as often as the growth reaches a stage when it would be in a suitable condition to be grazed off by dairy stock.

During the first three years of these tests the sulphate of ammonia dressing was applied on all plots at the rate of 2 cwt. per acre (1 cwt. in autumn and 1 cwt. in spring), but during last season the spring application (1 cwt.) only was given.

CALDERMEADE (*J. Davis*).

Strong Fertile Flats—Heavy Clay Loam.

The pasture on the Caldermeade plot consists of perennial rye-grass, Kentucky blue, subterranean and white clovers.

The grazing plots have been fed off with "young stock," and while the grazing records have shown some increase for the manured plots as compared with the untreated area, they do not reveal the extent of the improvement. The three sections receiving respectively

TABLE I.—MANURIAL TRIALS, CALDERMEADE.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
April 17 ...	29	43	41	48	45	49
Sept. 30 ..	77	167	149	140	166	148
Nov. 11 ..	75	76	90	85	89	88
Dec. 20 ..	26	37	39	43	44	45
1936.						
Jan. 24 ..	3½	2½	3	3	3	3

superphosphate 2 cwt.; superphosphate 2 cwt. + sulphate of ammonia 1 cwt.; superphosphate 2 cwt. + sulphate of ammonia 1 cwt. + lime 1 ton per acre, have all given similar responses, and show vastly improved swards both in composition and productivity, as compared with the unmanured plot. The nitrogenous dressing gave a good response in the first year, but its repeated use has not been beneficial. Neither lime nor potash has had any apparent beneficial effect on these plots.

The results obtained from the mowing manurial trial are shown in Table I.

TOORA (J. Kroezen).

Fertile Silt Flats—Deep, Grey-white Silt.

The Toora pasture consists of perennial rye, white and subterranean clovers, with some crested dogtail, Yorkshire fog, flat weed, and field daisy.

The manurial response on the rotational grazing plots has never been marked. The pasture had originally been improved by continued top-dressing, and the unmanured area continues to show a substantial residual effect. The pasture has always shown a good proportion of both white and subterranean clovers, and plots treated with sulphate of ammonia did not show any marked response. Neither lime nor potash has effected any improvement.

Table II. gives the results obtained from the mowing manurial trials.

Table II.—Manurial Trials, Toora.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
May 6 ..	56	71	63	68	65	76
Aug. 7 ..	6	17	11	10	14	16
Oct. 2 ..	34	70	87	81	95	70
Nov. 7 ..	57	64	64	65	69	64
Dec. 3 ..	32	40	37	36	40	43
1936.						
Jan. 21 ..	13	15	14	13	15	17

KORUMBURRA (F. E. Kurrle).

Hill Country—Fertile Grey Loam.

At Korumburra the pasture consists of Yorkshire fog, cocksfoot, subterranean and white clovers, with some crested dogstail and perennial rye.

Table III.—Manurial Trials, Korumburra.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt. S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt. Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
Feb. 28 ..	53	70	60	70	68	74
April 29 ..	17	23	18	25	20	28
Aug. 9 ..	12	21	16	19	18	22
Oct. 1 ..	8	24	25	34	35	25
Nov. 6 ..	35	71	55	65	64	70
Dec. 2 ..	28	38	35	38	39	40
1936.						
Jan. 20 ..	17	22	22	25	25	25

During the first years of these trials, the "superphosphate and nitrogen," and particularly the "superphosphate + nitrogen + lime" plots, on the rotational grazing section, showed much better growth than the plot receiving superphosphate only, the latter being little better than the unmanured area. More recently the "superphosphate only" plot has shown much better growth than the untreated one, but that receiving lime and sulphate of ammonia in addition to superphosphate has made by far the best growth. The cross strips of potash have not shown any improvement.

The results obtained from the mowing trial are given in Table III.

MIRBOO NORTH (R. E. Barrand).

Hill Country—Deep, Crumbly Red Clay.

The pasture at Mirboo North consists of Yorkshire fog, cocksfoot, red clover, together with some white clover, flat weed, and plantain (*Plantago lanceolatus*).

The response to lime (1 ton per acre), applied in addition to superphosphate, has been very outstanding on these grazing plots. Those receiving superphosphate only, or superphosphate + sulphate of ammonia are still very little better than the untreated area, but where the additional dressing of lime was given the pasture has been greatly improved. On the limed plot the sward consists of vigorous cocksfoot and white clover with few weeds, and very little bare space. It affords a marked contrast with the harsh weedy growth on the plots which have not received the lime dressing. A similar good response to lime has

been recorded on the mowing trial area. Cross strips of lime applied to the grazing plots during the past winter already have induced a good growth of white clover on the "superphosphate 2 cwt." plot. There has been no visible response to the potash treatment.

The weights obtained from the mowing tests are shown in Table IV.

TABLE IV.—MANURIAL TRIALS. MIRBOO NORTH.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
Feb. 27 ..	9	10	11	13	11	10
May 3 ..	5	5	6	10	8	6
Aug. 6 ..	1	1	1	2	1	1
Oct. 3 ..	2½	3	6	13	8	4½
Nov. 9 ..	12	15	17	27	18	16
Dec. 5 ..	11	12	12	18	13	14
1936.						
Jan. 22 ..	15	14	13	15	14	15

WARRAGUL (C. Tyssen).

Hill Country—Deep, Crumbly Red Clay Loam.

The Warragul pasture consists of cocksfoot and red clover with some subterranean clover and flat weed.

When first established the pasture on the grazing plots consisted mainly of cocksfoot and red clover. The nitrogen, and lime + nitrogen treatments, given in addition to superphosphate at that time, were the most effective. More recently, subterranean clover has become established, and although the "superphosphate + lime + nitrogen" plot is still making the strongest growth, it is not as outstanding as formerly. "Superphosphate only" is now showing a considerable improvement over the unmanured area, particularly where the subterranean clover has appeared.

Erratic results have been obtained with potash on the cross strips at Warragul. On some portions of the "superphosphate" and "superphosphate + lime" plots, it has given good results during the past year, but there was no visible response on the "superphosphate + nitrogen," or the unmanured areas. The mowing manurial area has never shown any material response to potash.

Table V. shows the results of the Warragul mowing trial.

TABLE V.—MANURIAL TRIALS, WARRAGUL.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
Jan. 29 ..	7	6	5	6	6	6
March 2 ..	19	18	19	21	19	20
May 1 ..	7	7	7	11	8	9
July 31 ..	2½	3½	2½	6	3	3½
Oct. 4 ..	4	13	10	27	15	14
Nov. 13 ..	22	56	30	43	35	56
1936.						
Jan. 24 ..	9	8	8	8	8	9

TABLE VI.—SHOWING RELATIVE PRODUCTION FROM VARIOUSLY MANURED PLOTS (MOWING TRIALS)—GIPPSLAND, 1932 TO 1935.

The production of the unmanured plots is expressed as 100. The "year" extends from 1st March to 28th February, except for the year 1932, when the mowing did not commence until July.

Year.	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 2 cwt.	Super. 2 cwt., S. of A. 2 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 2 cwt., Potash 1 cwt.	Super. 3 cwt.
Caldermeade.						
1932 ..	100	151	148	147	147	156
1933 ..	100	183	181	199	194	202
1934 ..	100	182	165	178	179	202
1935 ..	100	168	161	162	177	168
Toora.						
1932 ..	100	118	122	125	128	127
1933 ..	100	135	133	139	147	141
1934 ..	100	145	137	145	147	154
1935 ..	100	137	133	132	144	141
Korumburra.						
1932 ..	100	118	125	143	131	132
1933 ..	100	184	178	228	199	210
1934 ..	100	163	134	165	153	171
1935 ..	100	170	148	177	172	179
Mirboo North.						
1932 ..	100	119	135	148	140	125
1933 ..	100	121	136	172	144	130
1934 ..	100	107	118	157	132	116
1935 ..	100	105	113	170	127	115
Warragul.						
1932 ..	100	111	122	156	128	119
1933 ..	100	112	162	194	183	118
1934 ..	100	123	122	145	131	137
1935 ..	100	153	120	186	144	163

A Western District permanent pasture.

WESTERN DISTRICT.

LARPENT (A. S. Gladman).

Deep, Dark Sandy Loam.

The pasture at Larpent comprises perennial rye-grass and subterranean clover, together with some Yorkshire fog and flat weed.

The response to superphosphate on the Larpent grazing trial has always been very marked, and in the early years sulphate of ammonia also gave good results. More recently, potash, which has always effected an improvement on the mowing area, has shown up most markedly on the strips across the grazing plots. In the first year lime appeared to have a marked injurious effect on the sward here, but since then it does not appear to have had any effect on the pasture, either harmful or beneficial.

The results of the mowing manurial trials are shown in Table VI.

TABLE VII.—MANURIAL TRIALS, LARPENT.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
May 8 ..	10	13	14	14	13	14
July 30 ..	8	9	8	11	21	11
Oct. 17 ..	60	51	63	73	157	47
Nov. 15 ..	27	24	21	23	30	25
1936.						
Jan. 10 ..	10	13	12	13	14	14

TABLE VIII.—MANURIAL TRIALS, CORAGULAC.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
May 9 ..	13	14	15	14	13	12
Aug. 2 ..	13	18	25	17	20	18
Sept. 10 ..	30	42	51	49	49	39
Oct. 14 ..	57	74	64	68	64	74
Nov. 11 ..	24	26	24	23	22	25

CORAGULAC (E. W. Martin).

Rich Land—Heavy Red Volcanic Soil Overlying Scoria.

At Coragulac the pasture consists mainly of perennial rye-grass and nodding clover (*T. cernuum*) with some Yorkshire fog and subterrannean clover.

While the grazing plots showed a good response to nitrogenous manure during the first season, their subsequent response to all fertilizers has been small.

The growth on the supered plots has never been materially better than that on the unmanured areas except that there did appear to be some increase in the proportion of trefoils, and the stock showed a preference for the treated sections. Potash has never shown any response on the Coragulac plots.

The results obtained from the mowing manurial section are given in Table VIII.

Strong growth developed during the past spring by sowing and manuring on very light hill country.

GLENORMISTON NORTH (*K. Atkins and A. S. Noel*).

Deep Medium Clay Loam.

The pasture at Glenormiston North consists of perennial rye-grass and subterranenan clover with some Yorkshire fog.

Previous to the establishment of the grazing trials the pasture had been greatly improved by earlier top-dressings with superphosphate. The unmanured plot has continued to show a good response from these earlier dressings, and though the supered areas do show some improvement, this has never been very outstanding. Nitrogen brought about a good response in the early spring of the first two years, but its effect has since been much smaller. Neither lime nor potash has showed any appreciable beneficial effect on these grazing areas.

Table IX. shows the results of the mowing trials.

TABLE IX.—MANURAL TRIALS, GLENORMISTON NORTH.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
May 13 ..	41	52	41	49	43	56
July 31 ..	30	43	26	31	43	41
Sept. 12 ..	37	42	44	43	60	42
Oct. 24 ..	110	114	101	94	127	108
Nov. 14 ..	11	14	14	13	14	14
1936.						
Jan. 7 ..	13	18	16	18	16	18

CUDGEE (*E. R. Murfitt*).

Light Sandy Loam.

At Cudgee the pastures, though naturally light, have been greatly improved by top-dressing for dairying purposes. The sward on the plots consist mainly of perennial rye-grass and subterranean clover with cocksfoot and annual trefoils (*Medicago and Trifolium* spp.).

The grazing section has shown a remarkable response to dressings of superphosphate, and during the winter and early spring the increased growth on the supered plots has usually been about four times as great as that on the unmanured area. Nitrogen gave a marked response in the early spring of the first years, but its effect of reducing the proportion of clover in the sward was subsequently harmful. Neither lime nor potash has yet shown any benefit on the grazing areas at Cudgee.

The weights of produce obtained from the various manurial treatments on the mowing trial are set out in Table X.

TABLE X.—MANURIAL TRIALS, CUDGEE.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
May 15 ..	22	31	26	26	33	36
Aug. 1 ..	15	18	13	14	34	23
Sept. 11 ..	22	24	29	31	51	23
Oct. 18 ..	45	43	46	50	76	46
Nov. 14 ..	12	16	16	15	15	16
1936.						
Jan. 7 ..	2½	3½	3	2½	1½	2½

COBRICO (*Maskell Bros.*).

Shallow, Light, Buckshot Silt Loam.

The Cobrico pasture consists of perennial rye-grass, Yorkshire fog, sweet vernal (*Anthoxanthum odoratum*), with white clover, subterranean clover, and annual trefoils. The country is mainly light pasture land, which has been improved for dairying.

The response to superphosphate on the rotational grazing section has been good, but, owing to earlier top-dressing, the unmanured plot showed a benefit from the previous treatment. Potash has shown a greatly improved growth on the strips across the paddock receiving 2 cwt. super. Nitrogen, applied in addition to superphosphate, showed a good response in the second and third years, and more recently the plot receiving lime in addition to superphosphate and sulphate of ammonia has shown improved growth.

The results obtained from the mowing trial are shown in Table X.

TABLE X.—MANURIAL TRIALS, COBRICO.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.					
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Super. 3 cwt.
1935.						
May 4 ..	14	21	16	21	33	27
Aug. 27 ..	10	16	12	9	44	12
Oct. 21 ..	37	37	49	55	122	38
Nov. 13 ..	11	14	14	16	13	14
1936.						
Jan. 8 ..	14	18	16	19	19	19

TABLE XII.—SHOWING RELATIVE PRODUCTION FROM VARIOUSLY MANURED PLOTS (MOWING TRIALS)—WESTERN DISTRICT, 1932 TO 1935.

The production of the unmanured plots is expressed as 100. The "year" extends from 1st March to 28th February, except for the year 1932, when the mowing did not commence until July.

Year.	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 2 cwt.	Super. 2 cwt., S. of A. 2 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 2 cwt., Potash 1 cwt.	Super. 3 cwt.
Larpent.						
1932 ..	100	162	170	178	195	176
1933 ..	100	137	142	144	150	140
1934 ..	100	151	139	139	180	133
1935 ..	100	105	113	128	215	110
Coragulac.						
1932 ..	100	114	120	126	129	121
1933 ..	100	119	125	123	124	127
1934 ..	100	117	109	105	99	114
1935 ..	100	128	133	125	127	124
Glenormiston North.						
1932 ..	100	114	116	121	115	113
1933 ..	100	109	107	112	117	110
1934 ..	100	132	106	110	109	132
1935 ..	100	118	103	106	126	118
Cudgee.						
1932 ..	100	163	170	147	164	168
1933 ..	100	153	164	164	187	159
1934 ..	100	178	135	132	150	176
1935 ..	100	116	114	117	176	125
Cobrico.						
1932 ..	100	122	115	119	144	118
1933 ..	100	129	160	162	202	135
1934 ..	100	132	121	128	166	138
1935 ..	100	126	124	137	253	128

Mowing Trials—New Series.

During the winter of 1935 a new series of mowing trials was established in Gippland and the Western District, the object of which was to obtain additional information with regard to certain manurial treatments.

In Gippsland it was desired to test further the various materials on the red hill country soils, with particular reference to the addition of lime, while the possibility of the good response obtained with potash on the mowing areas of two of the Western District major plots being applicable to similar soils in the same districts, was of special interest.

Six plots were established on the red hill country of Warragul and Mirboo North and six in the Cobden and Larpent districts. Though smaller in size, these plots are similar to the mowing areas of the original major plots. Each complete manurial trial consists of a number of narrow plots 60 feet long and 4 ft. 6 in. wide. Each treatment is replicated three times. On the major plots the treatments were repeated six times, but it was considered that this gave a greater degree of accuracy than was necessary for ascertaining the manurial requirements of these pastures. The figures shown in each case are the mean of the yields of the three similarly treated plots.

GIPPSLAND.

LARDNER (R. S. Teese).

The pasture on Mr. Teese's property (Warragul District), consisted of a strong growth of subterranean clover and cocksfoot with some perennial rye-grass, Yorkshire fog and annual grasses. Great improvement had been effected previously with repeated top-dressing.

The plot was mown and manured for the first time on 11th July, 1935. The results obtained are shown in Table XIII.

TABLE XIII.—MANURIAL TRIALS, LARDNER.

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., Lime 1 ton.	S. of A. 1 cwt., Lime 1 ton.	Lime 1 ton.
1935.							
Sept. 19 ..	74	70	89	89	82	86	..
Oct. 30 ..	99	93	89	89	97	87	..
Nov. 27 ..	33	26	27	30	31	25	27
1936.							
Jan. 24 ..	4½	5	4½	5	5½	5½	5

WARRAGUL (C. Tyssen).

The new manurial trial on Mr. Tyssen's farm is situated on a native grass pasture adjacent to the major plot mowing area. This test was established to determine if a different type of pasture on a similar soil would give a similar manurial response. The native pasture was very weedy, consisting mainly of Yorkshire fog, flat weed, plantain (rib-grass), subterranean clover, Danthonia spp. (wallaby grass) with a little cocksfoot and rye-grass.

TABLE XIV.—MANURIAL TRIALS, WARRAGUL (C. TYSSEN).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., Lime 1 ton.	S. of A. 1 cwt., Lime 1 ton.	Lime 1 ton.
1935.							
Oct. 4 ..	10	21	34	27	17	13	..
Nov. 13 ..	52	68	72	69	63	53	49
Dec. 6 ..	23	30	32	38	35	29	22
1936.							
Jan. 24 ..	15	19	18	22	23	21	21

The plot was first mown and top-dressed on the 9th July, 1935. The yields of produce obtained are set out in Table XIV.

TABLE XV.—MANURIAL TRIALS, WARRAGUL (C. J. SNAPE).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., Lime 1 ton.	S. of A. 1 cwt., Lime 1 ton.	Lime 1 ton.
1935.							
Oct. 4 ..	13	16	22	24	16	22	..
Oct. 30 ..	26	27	25	32	32	30	..
Dec. 7 ..	34	36	37	40	41	35	36
1936.							
Jan. 23 ..	9	10	9	10	10	9	7

WARRAGUL (C. J. Snape).

Mr. Snape's pasture consists mainly of cocksfoot with a little red and white clover. It was sown down in 1932 with a mixture of cocksfoot perennial rye-grass, red, white and alsike clovers, and since that time has been top-dressed each year with one bag of superphosphate per acre.

The first mowing and top-dressing of this plot took place on 18th July, 1935. Table XV. gives the results obtained so far.

MIRBOO NORTH (L. J. Austin.)

The pasture on the plot situated on the property of Mr. Austin consists mainly of grass species: cocksfoot, with some rye-grass and a little plantain and flat weed, forming the bulk of growth. The winter growth is poor.

TABLE XVI.—MANURIAL TRIALS, MIRBOO NORTH (L. J. AUSTIN).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., Lime 1 ton.	S. of A. 1 cwt., Lime 1 ton.	Lime 1 ton.
1935.							
Oct. 3 ..	8	10	20	19	8	16	..
Nov. 8 ..	30	45	42	46	42	39	39
Dec. 5 ..	21	27	22	25	26	21	20
1936.							
Jan. 22 ..	10	10	10	11	10	9	10

The plot was first mown and manured on the 17th July, 1935. The results obtained are set out in Table XVI.

MIRBOO NORTH (Edney Bros.).

This plot is situated on the property of Messrs. Edney Bros. on the Mardan-road, and the pasture consists of Yorkshire fog, cocksfoot, and Danthonia, with some flat weed, clustered clover (*T. glomeratum*) and subterranean clover. The winter growth is poor.

The yields of green-stuff obtained since the plot was first mown and top-dressed on 16th July, 1935, are given in Table XVII.

TABLE XVII.—MANURIAL TRIALS, MIRBOO NORTH (EDNEY BROS.).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., Lime 1 ton.	S. of A. 1 cwt., Lime 1 ton.	Lime 1 ton.
1935.							
Sept. 20 ..	10	10	22	17	10	15	
Nov. 8 ..	49	57	62	71	69	53	42
Dec. 5 ..	21	25	24	25	26	21	21
1936.							
Jan. 23 ..	11	11	11	11	11	10	12

LIMONITE (G. W. Bickerton).

The pasture on Mr. Bickerton's property, which is situated in the Mirboo North district, comprises subterranean clover, cocksfoot, and

TABLE XVIII.—MANURIAL TRIALS, LIMONITE (G. W. BICKERTON).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., S. of A. 1 cwt.	Super. 2 cwt., S. of A. 1 cwt., Lime 1 ton.	Super. 2 cwt., Lime 1 ton.	S. of A. 1 cwt., Lime 1 ton.	Lime 1 ton.
1935.							
Sept. 20 ..	21	23	37	36	29	30	..
Oct. 30 ..	69	77	74	87	96	71	62
Dec. 4 ..	12	13	13	14	14	11	12
1936.							
Jan. 22 ..	8	8	9	8	8	8	9

One of the small new mowing areas at Mirboo North (Limonite).

Yorkshire fog, with a little rye-grass, Danthonia and flat weed. The winter growth is good and the pasture can be described as vigorous.

Table XVIII. sets out the results obtained to date. The plot was first mown and manured on 15th July, 1935.

Grazing Trial—Ellinbank.

In addition to the mowing trials in the Warragul district a small group of grazing plots has been established on the property of Mr. L. O. Youren, Ellinbank. The pasture on which this test was established lacked vigour, apparently as a result of previous cropping and grazing, with little return of plant food to the soil. It was considered therefore to be an unsuitable pasture on which to conduct a mowing manurial trial. The main constituents were Danthonia, silver grass (*Festuca bromoides*) and Yorkshire fog, with some rye-grass, cocksfoot, and annual clovers (mainly *T. glomeratum*). The weeds were chiefly plantain and flat weed.

A uniform area of this pasture was selected and fenced, making seven small grazing areas, each approximately one-sixth of an acre, which were given the following manurial treatment:—

1. No manure.
2. Superphosphate, 1 cwt. per acre.
3. Superphosphate, 2 cwt. per acre.
4. Superphosphate, 2 cwt. + sulphate of ammonia, 1 cwt. per acre.
5. Superphosphate, 2 cwt. + sulphate of ammonia, 1 cwt. per acre + lime 1 ton per acre.
6. Superphosphate, 2 cwt. + nitro chalk 1⅓ cwt. per acre.
7. Superphosphate, 2 cwt. + lime 1 ton per acre.

These plots are being grazed off at intervals with young stock, and it is anticipated that, assisted by the artificial fertilizer and the return of plant food as animal droppings, the fertility and growth of certain of these plots should be greatly improved.

WESTERN DISTRICT.

COBDEN (R. T. Stone).

This pasture on Mr. Stone's property is growing on naturally poor soil which has been improved greatly by repeated topdressing. It consists of sweet vernal, perennial rye-grass, Yorkshire fog, and flat weed with very little clover.

As potash was the main interest in these trials the manurial combinations were altered to test this fertilizer further.

The plot was first mown and topdressed on 13th July, 1935, and the results obtained are set out in Table XIX.

Table XIX.—Manurial Trials, Cobden (R. T. Stone).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., Potash 1 cwt.	Super. 2 cwt., Lime 1 ton.	Super. 2 cwt., Potash 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Potash 1 cwt.
1935.							
Oct. 21 ..	76	94	134	86	116	124	114
Nov. 12 ..	12	12	13	12	12	12	11
1936.							
Jan. 8 ..	15	18	20	16	18	19	17

COBDEN (J. Errey).

Mr. Errey's pasture consists of perennial rye-grass, sweet vernal, Yorkshire fog, flat weed, and Kentucky blue with very little clover. A good pasture has been developed here by the repeated topdressing of naturally poor land. Following the cutting of meadow hay the productivity of the field has declined, and winter growth is very poor.

Table XX. shows the yields of greenstuff obtained since the plot was mown (13th July) and topdressed (31st July) for the first time.

Table XX.—Manurial Trials, Cobden (J. Errey).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., Potash 1 cwt.	Super. 2 cwt., Lime 1 ton.	Super. 2 cwt., Potash 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Potash 1 cwt.
1935.							
Oct. 21 ..	36	44	57	39	63	75	51
Nov. 12 ..	14	15	18	14	18	18	17
1936.							
Jan. 8 ..	13	15	19	13	20	16	18

COBDEN (L. Vagg).

The plot pasture on the property of Mr. Vagg comprises perennial rye-grass and white clover with some Yorkshire fog, flat weed, sweet vernal, and suckling clover (*T. dubium*) and a little subterranean clover.

The growth on this pasture has been good during the winter and spring, and it does not appear to be suffering from any marked deficiency.

This plot was first mown on 16th July, 1935, and the manure was applied on 31st July. The results of the trial are set out in Table XXI.

TABLE XXI.—MANURIAL TRIALS, COBDEN (L. VAGG).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., Potash 1 cwt.	Super. 2 cwt., Lime ½ ton.	Super. 2 cwt., Potash 1 cwt., Lime ½ ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Potash 1 cwt.
1935.							
Sept. 12 ..	33	37	49	39	38	61	29
Oct. 23 ..	112	145	160	141	144	144	116
Nov. 12 ..	13	14	13	15	13	14	12
1936.							
Jan. 8 ..	15	18	17	20	18	16	15

COBDEN (J. Roberts).

Mr. Roberts' pasture is made up of perennial rye-grass, subterranean clover, Yorkshire fog, and white clover with some flat weed, bent grass (*Agrostis spp.*), and sweet vernal.

Table XXII. sets out the results obtained since the plot was first mown on 16th July, 1935, and manured on 31st July.

TABLE XXII.—MANURIAL TRIALS, COBDEN (J. ROBERTS).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., Potash 1 cwt.	Super. 2 cwt., Lime 1 ton.	Super. 2 cwt., Potash 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Potash 1 cwt.
1935.							
Oct. 23 ..	70	105	136	93	100	129	74
Nov. 13 ..	10	11	12	11	14	13	11
1936.							
Jan. 8 ..	11	11	15	13	13	13	11

LARPENT DISTRICT (J. McRae).

The pasture on Mr. McRae's property which is situated at Colac West consists of perennial rye-grass, silver grass (*F. bromoides*), subterranean clover, and flat weed. The winter growth of this pasture was fair only, and it previously had had little or no topdressing.

TABLE XXIII.—MANURIAL TRIAL, LARPENT (J. McRAE).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., Potash 1 cwt.	Super. 2 cwt., Lime 1 ton.	Super. 2 cwt., Potash 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Potash 1 cwt.
1935.							
Sept. 10 ..	11	26	33	27	32	37	11
Oct. 15 ..	41	88	104	84	96	90	47
Nov. 15 ..	29	48	50	47	52	46	31

The plot was first mown on 18th July, 1935, and the manure applied on 30th July. The results obtained to date are set out in Table XXIII.

LARPENT PARK ESTATE (N. Watchorn).

The pasture on this property comprises strongly growing perennial rye-grass, Yorkshire fog, and subterranean clover with some flat weed and suckling clover. The winter growth is strong and does not appear to be limited by any soil deficiency.

TABLE XXIV.—MANURIAL TRIAL, LARPENT PARK ESTATE (N. WATCHORN).

Date of Cutting.	Yields in cwt. of Greenstuff per Acre.						
	No Manure.	Super. 2 cwt.	Super. 2 cwt., Potash 1 cwt.	Super. 2 cwt., Lime 1 ton.	Super. 2 cwt., Potash 1 cwt., Lime 1 ton.	Super. 2 cwt., S. of A. 1 cwt., Potash 1 cwt.	Potash 1 cwt.
1935.							
Aug. 8 ..	31	32	36	31	34	36	26
Oct. 15 ..	22	23	25	22	21	21	20
Nov. 11 ..	32	33	33	33	34	33	32
1936.							
Jan. 10 ..	22	23	22	25	27	25	27

The first mowing took place on 18th July, 1935, and the manure was applied on 5th August. The yields of greenstuff obtained to date are shown in Table XXIV.

Establishing subterranean clover at Trawalla by surface sowing and top-dressing.

SURFACE ESTABLISHMENT TRIALS.

During the past year, tests were established on light sheep country soils at Trawalla, Buckley and Hamilton in the Western District. At Trawalla and Buckley they have taken the form of subterranean clover establishment trials on native pasture land, using varying quantities of manure and varying degrees of soil tilth. A pasture species trial also has been included in the Trawalla experimental plot. At Hamilton grass species establishment trials were begun on old subterranean clover pastures. One of these was merely combined and sown, while another was ploughed and well worked before seeding.

While it is early to draw conclusions from these trials they already give indications of supplying useful information for the treatment of light pasture land.

On the native pasture the subterranean clover has been readily established by lightly breaking the surface soil and giving a topdressing with superphosphate at the time of sowing the seed. Heavier dressings of superphosphate have promoted a stronger pasture growth, particularly of the volunteer trefoils, but it appears that a most satisfactory establishment has been obtained with the 90 lb. per acre dressings.

The final result of the tilth section will not be known until the pasture growth becomes more stable. It is already apparent that a better establishment of subterranean clover has been obtained on those plots which were most heavily scarified, but it is evident also that the native wallaby grass has been largely destroyed on these strips, and it will probably be slow in re-establishing against the aggressive subterranean clover.

On the pasture species trials at Trawalla most of the sown species made a weak establishment, and have since failed to develop. Portion of this plot has been fallowed, and a further seeding will be made this year. Soil fertility is very low on this class of land, and it is unlikely that any other species than subterranean clover will make satisfactory development here.

Trials for the introduction of other pasture species into established subterranean clover pastures have been made at Buckley and Hamilton. Where surface cultivation only was given before seeding, rye-grass has been the only species to make any headway, and even it has had difficulty in becoming established in competition with the vigorous subterranean clover. Other species have not been able to withstand the strong growth of the re-establishing subterranean clover following the cultivation, and have made very poor development.

At Hamilton, where an old subterranean clover pasture has been ploughed and well worked before seeding, an excellent establishment of most of the grass species has been obtained, and this plot should indicate the value of the various grasses for pasture purposes on land, which has been improved by the growing of subterranean clover for some years.

IRRIGATION DISTRICTS.

The extension of the experimental pasture work to the northern irrigation districts took place during last year when trials were commenced at Kerang and Swan Hill.

Kerang.

An area of five acres on Mr. F. Kane's farm, one mile south of Kerang, was sown down to pasture plots in mid-May, 1935. The soil on the area is a heavy clay loam and the land has flat grades. The area is characteristic of the

extensive areas on the Tragowel plains and the neighbourhood of Kerang. The seed bed was carefully prepared and the plot neatly check banked and channelled. A dry autumn made prospects bad, and it was decided to irrigate as a preparatory treatment. Rain which followed the irrigation jeopardized the establishment of the plots, but ultimately they were sown under good conditions on the 15th and 16th of May. The standard clovers were sown separately in the bays, and strips of the standard grass species were sown across the bays. A special plot of *Phalaris tuberosa* and subterranean clover was sown.

Half of the five acres was sown with a uniform mixture, and was designed for manurial tests which it is intended should be instituted this year.

The plot suffered from the exceptionally dry conditions which persisted in the north until the end of July, but most of the seed germinated, and by recourse to irrigation in mid-August a satisfactory establishment resulted.

During October, grazing with sheep was commenced, and has been continued regularly since. In November, the five acres of pasture carried 1,000 ewes and lambs for a week, and at the end of December 275 sheep were kept on the plot for ten days.

Swan Hill.

The tests at Swan Hill are situated on the farm of Mr. A. Douglas, Murraydale, and comprise an area of six acres. The soil is the heavy black loam of the flats. It is intractable and the grading and preparation of the seed bed entailed considerable difficulty. The district shared in the unfavourable weather conditions experienced at Kerang, and irrigation was necessary in April for cultivation. Sowing was carried out on 30th April, 1935, and 1st May on the same plan as the Kerang plots,

Arising directly from the dry winter very unpromising results were presented for some time after sowing, but the situation was relieved at the end of July. The plots were inspected on 6th August, and showed a patchy germination. Irrigation was carried out in mid-August, and by 8th October a luxuriant growth was in evidence. The area has since been grazed by dairy cattle at frequent intervals. The successful development of the plots, despite the adverse conditions, has demonstrated the value of extended preparation of land before sowing.

The species test plots will be regularly top-dressed and watered and careful records of the grazing kept. They should show the features of the different standard grasses and clovers in various associations.

Book Review

Sulphuric Acid Manufacture, by A. M. Fairlie

1936, 669 p.p., Illustrated, Price 9.75 dollars. (The Chemical Catalogue Co. Inc.).

EXISTING publications in English on sulphuric acid manufacture are either comprehensive treatises of three or four volumes or short text-books of an elementary nature. In the book under review a successful attempt has been made to present, in one volume, an up-to-date but authoritative account of the subject, omitting obsolete practices and impracticable proposals. The book is No. 69 of the excellent series of American Chemical Society Monographs, and the printing and the profuse illustrations are of the high order usual to this series.

The first half of the book is devoted to a discussion of the nitration or chamber process, covering materials of construction, the various stages of the process, operating details, and sulphuric acid purification and concentration. This is followed by a similarly exhaustive discussion of the contact process, its plant, and operation. The final pages consist of a number of tables of use in connexion with sulphuric acid manufacture.

The author naturally gives much more consideration to American practice than to European, but the book should be of particular value to those directly interested in the manufacture of sulphuric acid and to students of the subject, particularly as it deals very fully with improved technique developed and perfected in recent years.

W. R. J.

Experimental plots at Salisbury, in the Nhill district.

Nhill Crop and Fallow Competition 1935

Report of the Judge, A. B. Hackwell, B.Agr.Sc., Agricultural Instructor

THE value of farm competitions as an educational feature in our agriculture has long been recognized by the Nhill Agricultural and Pastoral Society, which has been conducting these projects for 35 years. Great interest in the competitions is still being taken by district farmers, and in the current season the splendid total of 67 entries was received in the various sections. The high standard of farming practised in this extensive wheat-growing district at Nhill in the north-western Wimmera was again evidenced by the many excellent crops grown this season.

The average yield of the 32 crops in the competition, grown on varying types of soil, was estimated at approximately 10 bags to the acre, the best exhibits being adjudged to return up to 13 and 14 bags per acre. The district average would be in the vicinity of 24 bushels per acre, and, taken as a whole, the season was the best experienced for several years. Despite this, however, it was by no means an ideal one, as the rainfall during the growing period was very irregular. Extended dry weather in late autumn and late spring was unfavorable for the production of unusually high average yields. The absence of a good soaking rain in May delayed cropping or, on the other hand, necessitated the sowing of certain land under dry conditions, with subsequent trouble from weeds. The district also was unfortunate in missing the copious October rains received elsewhere in the wheat belt. The crops, however, ripened slowly, with a good colour in the straw, and an excellent sample of grain was formed. Heavy rains during harvest resulted in some of the wheat becoming bleached, but fortunately about two-thirds of the crop in this district had been stripped before the storms, and the bulk of this was undamaged.

The rainfall in points, recorded in the township during 1935 and the average monthly registrations for the previous 51 years are shown in the table at the foot of this page.

Wheat Varieties.

A feature of the wheat-growing at Nhill has been the rapid and widespread use of the variety Ghurka. The splendid performance of this wheat in the local experimental plots since it was first tested in 1931 has encouraged farmers to sow it extensively. Its use in this

——	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.	pts.
1935	35	20	143	103	98	206	231	184	233	81	74	97	1,505
Average, 51 years ..	64	77	85	118	166	206	168	179	179	155	117	101	1,615

locality has been consistently advocated by the Department of Agriculture for the past four years, and after being proved by farmers to be satisfactory for bulk areas, Ghurka has gradually become the premier wheat of the district, having displaced Free Gallipoli from that position. It is of interest to recall that in the Nhill competition conducted four years ago only two crops of Ghurka were submitted for judging, whereas in the current season 20 of the 32 exhibits were sown with this variety, representing 66 per cent. of the 1,500 acres inspected. In addition to its heavy yielding ability, Ghurka is a splendid wheat to thresh. It also possesses a marked resistance to flag smut disease, and in view of its all-round qualities it is well worthy of being the major variety for practically every farm in this locality.

In the 1935 tests at Salisbury, Free Gallipoli again yielded well, and retained its position as the second highest yielding variety to Ghurka. In so far as yielding capacity is concerned, Free Gallipoli, by its behaviour over many years, has proved itself a prolific wheat, and on the black and mixed land in this district it generally outyields all other varieties, with the exception of Ghurka. On the Mallee land and lighter country, Ranee 4H is worthy of inclusion in conjunction with Ghurka, but the former variety is not recommended for the black soils, as usually it does not do so well on this class of land as do Ghurka and Free Gallipoli.

With regard to newer varieties, several promising cross-breds are now claiming attention as a result of their good performances in various experimental plots, but before any can be released they must prove themselves at least equal to the above-named wheats over an extended period of test, both in yield and general characteristics.

Another feature at Nhill this year was the introduction, on a number of farms, of limited areas of the higher-strength wheats—Dundee, Baringa, Hard Federation, and Pusa, for all of which a special premium of 6d. per bushel had been offered by the management of the local flour mill. Some splendid crops of Dundee and Baringa were grown, and, with the extra price available, in many instances a profitable investment resulted.

The question as to how these varieties would yield in comparison with the standard wheats was investigated in the local plots at Salisbury. In these experiments the wheats are subject to an accurately conducted test under even conditions of soil, &c., and, in addition to the above four varieties, other improved quality wheats, such as Baldmin and Ford, were also included this year. The results at Salisbury, in the 1935 season, were that all of the introductions, with the exception of the Dookie-bred variety Baldmin, gave a lower yield than Ghurka and Free Gallipoli, the reduction below the latter variety ranging from 4 per cent. in the case of Dundee to 33 per cent. with Ford.

Naturally, great interest has been taken in these newer varieties, and any farmers contemplating the sowing of an increased area with any of them should give the matter careful consideration. While the premium of 6d. per bushel is available, no doubt there is justification for sowing these varieties, preferably Dundee or Baringa, but before adopting the wheats on a large scale it would be advisable to wait until definite evidence is available as to (1) the extent of the demand for these wheats at a premium price, and (2) their yielding capacity and general behaviour over a period of varying seasons. The safer plan would be to concentrate mainly on wheats of proved yielding ability under local conditions, such as Ghurka, and await further results from accurately-conducted experiments before making any radical change.

Competition Crops.

Many of the crops this season were not so clean as usual, due mainly to the difficulty of obtaining a final germination of the rubbish in the dry conditions early in the cropping season, also in some cases to neglect in the earlier cultivation of the fallows. Mustard and wild oats were the main weeds, and the red land crops, which had to be sown promptly, were the worst off in this regard. The sowing of the black land on most farms was delayed until after rain in June. In several of these crops mustard developed freely, and the resultant weed competition naturally depleted the yield. Concentrated effort is necessary to suppress this weed, and a splendid example of how it can be effectively done was shown in the paddock entered in the competition by Mr. A. F. Dahlenburg, at Kiata. Before being fallowed, this area (black land) was particularly bad with mustard; nevertheless, by adopting early and careful cultivation whenever the opportunity offered to kill a fresh growth of seedlings, the weed was completely eradicated, and a remarkably clean crop was grown. The land was summer fallowed with a disk in February,

scarified twice in winter, sheeped and worked twice with the combine in spring, and given three strokes with the shear-harrows, once in October, early May, and early June.

Disease was a minor feature in most crops this year, and the majority were very healthy. One entry, however, contained a little ball smut, two were badly infected with flag smut, while in two others on very stiff red ground there was an appreciable loss from dead heads. In all exhibits except one, the seed had been dry pickled.

Feeding-off the wheat with sheep was practised this season to a limited extent only, due in some cases to the backward growth of the crops throughout the winter. Of the 32 exhibits in the competition, six had been fed-off bare, while one or two were lightly grazed. The practice of feeding-off, of course, is undertaken to obtain additional feed or, in some cases, to check rank growth so as to minimize the risk of lodging, or, again, to thin out a very dense crop to render it less liable to suffer during dry weather later in the growing period. As there is very little precise information available as to the effect of grazing on the subsequent yield of the wheat, a series of experiments on this feature was introduced into the Salisbury tests this year. Two sections, each of five plots of Free Gallipoli, were included, and it was planned for one to be fed-off according to the average practice in the district, and for the other to be left without grazing, and the respective yields compared. Owing to late sowing and slow germination, very little growth was made during the winter. The grazed section was fed-off bare in early August at the rate of 20 sheep per acre for one and a half days, and the other section was untouched. The yields obtained in this, the initial year of the test, were:—Fed-off section, 28.9 bushels per acre; ungrazed section, 31.2 bushels per acre; showing that the feeding-off this season resulted in a depression of the yield by 2.3 bushels per acre. It is to be expected that the effects of feeding-off will vary from season to season, and there is no reason to assume that the reduced yield obtained this year will occur always. Many factors are involved, and the experiment will have to be conducted over a number of seasons before any definite conclusions can be drawn.

The value of the feed obtained also has to be taken into consideration, and, as on many farms nowadays more sheep are run than formerly, the feed aspect has become of increased importance. So much so that one grower raised the question as to whether farmers using large areas of Ghurka would not have to re-adjust their grazing arrangements in view of the possibility of less feed being available from this short-strawed variety. The question of feeding-off is necessarily a matter of individual farm management, and the main precaution to be exercised is to ensure that the grazing is not practised too late in the season. It is for the farmer himself to decide whether the extra sheep feed obtained from the grazing is of more value to him than the wheat he may be liable to lose. In this connexion, the new experiments may be expected to afford a valuable guide.

Harvesting wheat at Nhill.

NHILL CROP AND FALLOW COMPETITION, 1935.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total.	Fallow, 1934.	Fallow and Crop.
				Weeds.	Disease.				
Maximum Points	.. .. ..	35	20	15	15	15	100	100	200
SECTION 1.—Best 50 acres of Wheat Crop.									
John Clark*	Free Gallipoli ..	35	18	14½	14½	15	97	..	..
J. and T. W. Rintoule, No. 1	Baringa	32	19	14½	14½	15	95	..	..
A. F. Dahlenburg ..	Ranee 4H	29½	19½	15	15	15	94	..	..
E. G. Hoffman ..	Dundee and Ranee 4H	31	19	14	14	14	92	..	..
C. P. Dahlenburg ..	Ghurka	31	18	13	15	14	91	..	..
E. W. Dahlenburg, No. 1	„	27½	18	13	14½	14	87	..	..
E. W. Dahlenburg, No. 2	„	27	18	13	15	13	86	..	..
J. and T. W. Rintoule, No. 2	Free Gallipoli and Dundee	26	18	14	14	14	86	..	..
J. L. Judd and Sons, No. 2	Free Gallipoli ..	24	19	14½	14	14	85½	..	..
J. L. Judd and Sons, No. 1	„ „ ..	24½	19	14	12	14	83½	..	..
P. Bone	Ghurka	24½	17	13	15	14	83½	..	..
John Dart	Ranee 4H	21	17	13	12	13	76	..	..
SECTION 3.—50 acres Black Land Fallow, 1934, and the crop grown thereon, 1935.									
C. P. Dahlenburg* ..	Ghurka	31	18	13	15	14	91	97	188
Geo. Batson, No. 2 ..	„	28½	17½	14	15	14	89	97	186
H. H. Sanders* ..	„	32	17½	12	13½	14	89	96	185
C. P. Dahlenburg and Voight	„	28	18	13	14½	13½	87	97	184
E. W. Dahlenburg, No. 1*	„	27½	18	13	14½	14	87	97	184
Geo. Batson, No. 1 ..	„	28	17½	12	14½	13	85	98	183
E. W. Dahlenburg, No. 2	„	27	18	13	15	13	86	95	181
P. Bone*	„	24½	17	13	15	14	83½	93	176½
Eric Dahlenburg ..	„	22	18	12	15	13	80	96	176
R. Blackwood* ..	„	23	17½	11	15	13	79½	95	174½
E. G. Hoffman* ..	Federation	23	19	13	13	13	81	92	173

* Entry in "E. Bound and Sons'" Competition.

The Awards.

BLACK LAND CROPS.

An exceptionally good crop of Free Gallipoli estimated to yield approximately 14 bags to the acre, won the Open Section this year. It was entered by Mr. John Clark, and was grown at Kinimakatka on a very fertile box flat of a swampy character. The crop was particularly dense and even over the whole paddock. The heads were particularly well developed, and the entry was very clean except for an odd wild oat and a little barley. The rainfall in this locality was practically the same as at Nhill, and totalled approximately 11 inches from May to November, inclusive. Only 36 points were received in October, and, whereas this dry weather caused a diminution in yield on many other farms in the district, apparently it had no detrimental effect on this exhibit. Mr. Clark's crop was grown on land noted for its high productive capacity. Nevertheless, this particular soil has its own special problems, and has to be well farmed to maintain good yields. Its loose nature renders consolidation a difficult matter, and increases the possible danger from take-all infestation. The exhibit this year was free from any serious disease.

The crop had been sown in late May and early June with 90 lb. of seed per acre, and a similar dressing of superphosphate. It was not fed-off, and was grown on summer fallow prepared with a scarifier in March, May, and July. The paddock was then harrowed in August, spring-toothed in November, and harrowed several times in late summer, and once a few days after cropping.

The second-prize crop, Messrs. J. and T. W. Rintoule's entry of Baringa, was also of particularly high standard. It is very dense, tall, even, and clean, and promised a heavy yield. The purity of the seed was good, but the yield appeared to be not so high as that of the winning entry. This exhibit was sown in the first week of June with seed and superphosphate both at 71 lb. per acre, and the crop was not fed-off.

A very attractive crop of Ranee 4H, grown by Mr. A. F. Dahlenberg at Kiata, secured third place in the Open Section. The crop displayed evidence of particularly good farming, and secured the highest award in all features but yield. It was grown on carefully worked summer fallow, as described earlier in this report, and was sown at the end of June with 75 lb. per acre of both seed and superphosphate, and it was not fed-off.

Several of the other entries on black land were also of good standard. The majority was sown between late May and mid June at an average rate of seeding of 70 lb. per acre, ranging between 60 lb. and 90 lb. per acre, The manurial dressing varied from 60 lb. to 100 lb., the average application being 72 lb. per acre.

The aggregate section for black land fallow and crop was won by Mr. C. P. Dahlenburg with a splendid exhibit of Ghurka, grown on well-prepared fallow. It was sown on 20th and 21st May with 75 lb. of seed and 70 lb. of superphosphate per acre, and was heavily fed-off in mid July. Over the bulk of the area the crop was very dense—in many of the spikelets three grains had developed, and a heavy yield was apparent. The crop was free from disease, but contained wild oats and an odd foreign head. It was grown on winter fallow prepared with a scarifier in July, harrowed twice, sheeped and combined twice before harvest, and finally given a stroke with the harrows (with shear points attached) about a month before cropping.

Mr. Geo. Batson's No. 2 entry, which gained second prize in Section 3, also produced a good exhibit of Ghurka. Although the crop was short—it had been fed-off bare in early August—the heads were well filled, and a good yield was anticipated. The exhibit was free from disease, but contained a little mustard and a fair number of strangers. It was grown on a heavy black plain which had been well fallowed prior to harvest, harrowed in March, and sown at the end of May without further working. About 77 lb. of seed per acre and a similar quantity of superphosphate were applied.

Of the eleven exhibits in this section, ten had been sown with Ghurka. In a number of cases the seed was not very pure, and growers were advised to secure some first class seed as soon as possible with which to build up their

Crops on Mallee Land.

On many farms in the Mallee land areas to the north and north-west of Nhill a particularly dry season was experienced from September onwards, and the crops suffered severely. Under these conditions, an extra shower or two made a big difference. Generally, the crops on the loamy land did best, and some of the entries in the competition were very creditable. The seven crops exhibited were estimated to return an average yield of 8½ bags to the acre. They were sown at varying times between mid May and mid June at 70 to 75 lb. of seed per acre, with a manurial dressing ranging from 60 to 100 lb. per acre.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total.	Fallow, 1934.	Fallow and Crop.
				Weeds.	Disease.				
Maximum Points	.. .. ..	35	20	15	15	15	100	100	200
Section 2.—50 acres of Wheat Crop Grown on Mallee Land.									
H. Leyonjhelm ..	Free Gallipoli ..	24	18½	14½	14	15	86	..	..
H. E. Siemmering ..	Ghurka	24	18	14½	14	14	84½	..	..
Rupert Wheeler ..	Dundee and Sword ..	23	18	14	14	14	83	..	..
R. D. Buckley ..	Ghurka	23	18	12½	15	12½	81	..	..
J. C. Buckley, No. 2 ..	„	21	18	14	15	12	80	..	..
J. C. Buckley, No. 1 ..	„	21	18	13	15	12	79	..	..
T. G. Marshall ..	Free Gallipoli ..	18	17½	14	12	13	74½	..	..
Section 5.—50 acres of Fallow on Mallee Land, 1934, and the Crop thereon, 1935.									
H. Leyonjhelm ..	Free Gallipoli ..	24	18½	14½	14	15	86	95	181
H. E. Siemmering ..	Ghurka	24	18	14½	14	14	84½	94	178½
J. C. Buckley, No. 2 ..	„	21	18	14	15	12	80	98	178
J. C. Buckley, No. 1 ..	„	21	18	13	15	12	79	98	177
R. D. Buckley ..	„	23	18	12½	15	12½	81	96	177

Competitor.	Variety.	Yield.	Purity and Type.	Absence of—		Evenness.	Crop Total.	Fallow, 1934.	Fallow and Crop.
				Weeds.	Disease.				
Maximum Points	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
SECTION 4.—25 acres of Red Fallowed Land, 1934 and the Crop Grown Thereon, 1935.									
Alf Dahlenburg and Oldfield	Ghurka	24	15	13½	13½	14	80	94	174
R. D. Buckley ..	„	18	18	12	14½	13½	76	96	172
C. P. Dahlenburg, No. 2	„	17	18	13½	13	12½	74	95	169
H. Leyonhjelm ..	„	16	18	12	14	14	74	94	168
Lionel Clark	„	20	16	12	14	12	74	93	167
C. P. Dahlenburg, No. 1	„	15	18	13	12	12	70	95	165

Mr. H. Leyonhjelm secured first award in the two Mallee land sections with a very commendable crop of Free Gallipoli. It was very clean and even, and had not suffered to any extent in the dry spell. The heads had filled well and ripened slowly, and a substantial yield would be obtained. Half the area had been sown in the third week of May, and the balance early in June, with seed at 75 lb. and superphosphate at 65 lb. per acre. The paddock was not fed-off.

Mr. H. E. Siemmering's crop of Ghurka would also yield well, and this entry obtained the second award in the two sections. It had been sown in late May and early June with 70 lb. of seed and 1 cwt. of superphosphate per acre, and was not grazed.

CROPS ON RED LAND.

The season was generally unfavorable for the production of good crops on red land. A number had made a patchy germination, weeds were fairly prevalent, and in some cases dead heads had developed. The crops inspected were all sown in May, and it was estimated that they would average from 6 to 7 bags per acre.

Mr. Alf. Dahlenburg's crop of Ghurka was the heaviest and best all-round exhibit, and the entry won the aggregate for the fallow and crop. It was grown on Mr. Oldfield's property, on red cementy soil. The heads were very well filled, and good plump grain was formed. There were very few dead-heads present, and a splendid yield for this class of land would be obtained. The exhibit, however, lost several points on the score of purity, as a butt of Free Gallipoli had been inadvertently mixed with the seed. The crop was sown in the first week in May with 70 lb. of seed and 60 lb. of superphosphate per acre, and was subsequently fed-off.

The other exhibits in this section were of a very moderate standard, and had suffered from unfavorable seasonal conditions.

Mr. R. D. Buckley's entry, which gained the second prize, was grown on red cementy sandy loam, with a stiff clay subsoil. The fallow had been well prepared, but the crop unfortunately made very thin growth, with small head development. Wild oats were prevalent, but the wheat was free from disease. The fallow had been finally worked with a spring-tooth cultivator in May, and was sown late in June with 70 lb. of seed and 60 lb. of superphosphate per acre, and the paddock was not fed-off.

The Fallows.

With one or two exceptions, the fallow exhibits in each section this year were of very even standard. All showed a high moisture content, and the majority were very clean.

The bulk of the farmers in this district have learnt from long experience that the maintenance and production of good crops are dependent on the preparation of good fallow, and on most farms a high standard of fallowing is achieved. In some cases, particularly where more sheep are carried than formerly, more use is made of the fallows for the provision of sheep feed. Sheep normally are used in addition to cultivation, but the extent to which they can replace cultivation is a matter for consideration. Experience on the experimental fields at Longerenong and the other centres indicates that neglect in cultivating the fallows, and replacing the work by sheep, usually results in a marked reduction in the wheat yield. Farmers who pursue this practice have, therefore, to consider whether the extra sheep feed obtained from neglecting the fallow compensates for the loss in wheat. In many instances this may not be the case, and no doubt a better

Carting wheat to the Nhill yard.

plan would be to maintain a good standard of fallow on the area reserved for wheat-growing, and obtain additional feed from other land sown with, say, oats for grazing.

One of the main essentials in fallowing is to suppress weed growth, which, of course, robs the soil of moisture and plant food which should be reserved for the benefit of the wheat crop. After the fallow has been formed this question of weed control is the main factor, on most soils, which determines the necessity for further cultivation. As to the amount of work that should be given to fallowed land, experience has shown that the best fallows are not necessarily those given the greatest number of cultivations, but rather those on which the work is efficiently performed at the most appropriate time. The bulk of the black land entries this season had been summer fallowed in March, and after the winter working three strokes during spring and early summer, combined with sheeping, were found sufficient to effectively control the weeds, and produce good quality fallow.

Of the many splendid exhibits in this section, Mr. Geo. Batson gained the highest award with a very attractive fallow on even, level, black land. The paddock, which had been cropped on the four-course rotation, fallow, wheat, oats, grass, had been brought into very good order. It was particularly clean, with an excellent mulch and consolidated seed bed. After being summer-fallowed with a disk in March, it was neither ploughed nor scarified, but an effective job was done with a spring-tooth cultivator, used once in July, August, and September. It was sheeped when required, and given a stroke with the harrows (with

THE FALLOWS.

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation and Seed Bed.	Total.
Maximum Points ..	**25**	**25**	**25**	**25**	**100**
SECTION 6.—50 Acres Black Fallowed Land, 1935, and Crop, 1936.					
Geo. Batson ..	25	25	24½	24	98½
C. P. Dahlenburg, No. 1 ..	25	24	24½	24½	98
P. Bone* ..	25	24	24	24½	97½
C. P. Dahlenburg, No. 2* ..	25	24	24	24	97
E. W. Dalhenburg, No. 1* ..	25	23½	24½	24	97
E. G. Hoffman* ..	25	24	24	24	97
John Clark* ..	25	23	25	23	96
H. H. Sanders* ..	25	24	23	24	96
E. W. Dahlenburg, No. 2 ..	25	23	22	23	93
R. Blackwood* ..	24	22	20	21	87
SECTION 7.—50 Acres Mallee Land Fallow, 1935, and Crop, 1936.					
H. Leyonhjelm ..	25	23½	23½	24	96
A. C. and A. H. Dufty ..	25	23	24½	23	95½
J. C. Buckley ..	25	23	24	23	95
R. D. Buckley ..	25	23	24	23	95
T. G. Marshall ..	25	23	24	23	95
SECTION 8.—25 Acres Red Fallowed Land, 1935, and Crop, 1936.					
C. P. Dahlenburg, No. 2 ..	25	24	24	24	97
H. Leyonhjelm ..	25	24	24	23	96
C. P. Dahlenburg, No. 1 ..	25	24	24	23	96
John Clark ..	24	23	23	23	93

* Denotes entry in the "E. Bound and Sons'" Competition.

[*Continued on page* 216.

Echuca Irrigated Pasture Competition

Report of the Judges—E. T. Beruldsen, B.Sc. (Agric.), Senior Irrigation Officer, and A. Morgan, B.Agr.Sc., Irrigation Field Officer

IN reporting on the 1934 competition, it was predicted by the judge that "judging by the keen interest shown, a greater number of entries is expected next year." Consequently, it is very satisfactory to report that not only were the entries more than doubled in number, but also, realizing the importance of inspecting the pastures under different seasonal conditions, the local Agricultural and Pastoral Society arranged for two inspections of the exhibits—one in October, 1935, and one the following February. The latter inspection provided an opportunity for evaluating a pasture more fairly, the general luxuriance of growth during the spring tending, at that time, to obscure blemishes. From this point of view, and for the information of the exhibitors, the details of the awards are given for both inspections.

Mr. G. W. Dobson's winning pasture, during the October inspection.

As in the previous year, the genuine interest of exhibitors and non-exhibitors was manifested by the number of people who accompanied the official party, many taking the opportunity to discuss various problems. In the few years since the establishment of irrigated pastures was first attempted at Echuca, remarkable progress has been made, both as regards the extension of the area sown down, and in the improvement of pastures established for a few years. Most of the pastures inspected compared favorably with the best to be found in districts where irrigated pastures have not been such a recent innovation.

One of the most serious problems with which the farmers in this district are confronted is the very flat nature of the country and the great risk of waterlogging which ensues. Heavy rain, succeeding an irrigation or accidental leakage, has sometimes caused water to lie on pastures for prolonged periods, resulting in considerable damage. In some cases this could be prevented by making use of natural facilities for drainage, but in others these facilities did not exist. All the more reason, therefore, for a very thorough preparation and grading before sowing, and the adoption of short and not too wide bays. Bays of 1 chain width were quite common, and, although in flat country few checkbanks are required to guide the water, the adoption of bays not wider than 40 feet, and not longer than 4 or 5 chains, will ensure that the water does not lie too long on the ground. Care must be exercised to shut the water off at the right time, and wherever possible small drainage channels should be excavated. Of course, the wet conditions described would be fatal to lucerne, but it is a matter for consolation that pastures are so resilient, and that the damage in their case is not always permanent, but that they can gradually recover under favorable conditions.

Throughout the inspections, cultural methods with regard to watering and top-dressing with superphosphate were found to be satisfactory generally. Indeed, some were considering the advisability of seeking further improvement by the application of lime, and in one case ammonium sulphate had been applied. The application of these materials is not recommended until proof of their benefit has

been obtained from a small trial area. One cannot generalize as to the effectiveness of either in a district, but as their use is so costly one must be assured of an economic return. Some farmers were inclined to use lime in an endeavour to improve the quality of the herbage by raising the mineral content. At Werribee, under carefully controlled conditions, it was found that the herbage from plots of irrigated pasture which had received 4 cwt. of superphosphate, had a lime content as high as that from plots which had received 4½ tons of lime in six years in addition to 2 cwt. of superphosphate each year. The cost of the extra superphosphate was not nearly as great as that of the lime, and as the "superphosphate-4-cwt." plots yielded more than the "superphosphate + lime" plots, there is no doubt as to which treatment gave the better return.

Cereals and grasses often respond to dressings of ammonium sulphate, but extensive and refined experimentation with this manure on mixed pastures under irrigation where clover is a prominent component has never shown any economic returns. True, a transient response has been noted as the result of winter applications, but this result has been offset, usually by a decrease in the production during the summer. To use this manure with the intention of improving the balance of grass to clover in the mixture is costly when this result can be achieved by management of the grazing. It

ECHUCA PASTURE COMPETITION, 1935-36 (TWO INSPECTIONS).

Name of Competitor.	Lay-out of Ground for Irrigation and Condition of Channels.	General Condition of Pasture.	Uniformity.	Mixture.	Freedom from Weeds.	Total.	Grand Total.
--	(20)	(20)	(20)	(20)	(20)	(100)	(200)
G. W. Dobson	19	19	19	19	19	95	..
	19½	18½	19	18	19	94	189
H. P. Watson, No. 1 ..	18	19	18	19	16	90	..
	17½	18½	19	18	18	91	181
D. G. M. Christie ..	17	18	18	19	18	90	..
	16	19	18	17½	19	89½	179½
H. P. Watson, No. 2 ..	17	19	18	19	17	90	..
	17	17	19	18	18	89	179
S. E. Paynter, No. 1 ..	18	18	18	17	18	89	..
	18	18	18	17½	18	89½	178½
A. L. Clymo	18½	16	17½	19	16½	87½	..
	18	19	18	19	17	91	178½
J. C. Evans	18	17	18	18	19	90	..
	18	17	17	17½	16	85½	175½
F. C. Gilham, No. 2 ..	17	17	18	18	18	88	..
	17	17½	18	18	16	86½	174½
A. E. Patman, No. 1 ..	18	18	17	18	15	86	..
	17	17	18	18	18	88	174
H. G. Ogden, No. 2 ..	17	18	17	18	17	87	..
	18	16	18	17	18	87	174
S. E. Paynter, No. 2 ..	17	17	16	18	17	85	..
	17	18	18½	17½	17	88	173
H. G. Ogden, No. 1 ..	16	18	16	17	17	84	..
	17	18	17½	17	18	87½	171½
F. C. Gilham, No. 1 ..	17	17	16	18	17	85	..
	17	15	16	16	17½	81½	166½
B. McColl, Vance (1) ..	18	16	16	16	17	83	..
	18	16	16	16	16	82	165
B. McColl, Vance (2) ..	16	17	16	16	17	82	..
	17	15	16	15	17	80	162
W. Ash	16	16	16	18	15	81	..
	16	15	17½	16	15	79½	160½
A. E. Patman, No. 2 ..	18	18	17	17	16	86	..
	17	13	14	15	15	74*	160

* Scalded out badly.

NOTE.—In each case the results of the spring inspection are indicated first.

Some of Mr. S. E. Paynter's stud Shorthorns on irrigated pastures.

has been established that, after complete grazings, an interval of four weeks, on the average, between grazings will retain a good balance of grasses and clovers. Some latitude is allowed as the recuperative period must of necessity be shorter in the spring flush period and longer in the winter months.

One pasture had deteriorated through having been cut three times in succession for meadow hay. However desirable it is to conserve fodder for the lean periods, only the older-established pastures should be reserved for meadow hay for one cut only, and then it is advisable that a paddock reserved in this manner should not be reserved the following year. The opening of the sward is very noticeable; suppression of clovers and the spaces between plants afford an excellent opportunity for weeds and inferior fodder plants to establish themselves.

It was satisfactory to note that in most cases only the best strains of the various grasses and clovers had been sown and that as a result of good treatment with regard to manure, a vigorous strain of white clover was spreading rapidly in certain instances.

The Awards.

The winning pasture was exhibited by Mr. G. W. Dobson. The 5 acres was fallowed and sown down in April, 1933, with Colac perennial rye-grass 2 lb., Italian rye-grass 3 lb., cocksfoot, 2 lb., and 2 lb. each of perennial red, alsike, and New Zealand wild white clovers per acre. Superphosphate at the rate of 90 lb. per acre was used at seeding, and a further 80 lb. was applied in April, 1934. In November, 1934, two bags of superphosphate per acre was applied, followed by one bag per acre of a superphosphate and ammonium sulphate mixture in June, 1935 Fortnightly waterings were given during the summer months. As evidence of its high production, 30 head of cattle grazed continuously on the paddock for five weeks in the autumn of 1935 without ever being pushed for feed. The paddock was in excellent heart at the spring inspection, being very uniform and just at the right condition for grazing. The small patches which had not developed properly during the previous year had been improved and built up by the application of farmyard manure. During February the paddock evidently had suffered from the hot dry conditions, combined with the fact that the soil does not absorb water readily. However, it was in a good fresh condition and very uniform. All species in this pasture were well-represented, while very few weeds were noted. The lay-out and condition of the channels was very good.

Mr. H. P. Watson, of Echuca Park, gained second place with one of two excellent exhibits, each of 14 acres. Pasture of perennial species is a new development on Mr. Watson's property. Already he had carried out extensive pasture improvement through the medium of subterranean clover. The exhibited pasture had been sown down as recently as July, 1934,

and an excellent sward had developed considering the short time since establishment. The mixture was composed of Hawke's Bay perennial rye-grass, cocksfoot, prairie grass, and alsike, subterranean, and New Zealand wild white clovers. At seeding, 90 lb. of superphosphate per acre was used, while further dressings of 1 cwt. per acre were applied in November, 1934, and June, 1935. The pasture is watered every three weeks or when necessary. The herbage is kept in an ideal short condition by regular grazing with from 50 to 80 cattle, followed by sheep. Although the bays are long, an adequate fall is present. Prior to the spring inspection, heavy rain followed an irrigation, causing small scalded patches to detract slightly from the uniformity. All species were well represented, and white clover and cocksfoot were developing remarkably well considering the pasture had been established such a short time.

From a sward point of view, and from its evidently high production, Mr. D. G. M. Christie's pasture, of 4 acres, could hardly be excelled; but the lay-out, and a portion which detracted from the uniformity, handicapped the exhibit. Although sown, cocksfoot was not much in evidence, but this is possibly due to competition from the very excellent sward of perennial rye-grass. The pasture was sown down in April, 1932, with 15 lb. Hawke's Bay rye-grass, 4 lb. cocksfoot, 2 lb. Kentucky blue-grass, 3 lb. perennial red clover, 2 lb. alsike, and 2 lb. New Zealand wild white clover. Kentucky blue-grass, although sparse, is becoming more prominent in the pasture. The paddock has been liberally treated with superphosphate since its establishment, and is watered every fortnight during the summer. Perennial rye-grass and white clover are the main constituents. This exceptionally good pasture provides grazing for 22 milking cows for eight to ten days each month.

The general standard of exhibits was excellent, and a very keen interest was shown by the competitors.

Book Review

Potash Research—by Professor O. Eckstein

"Arbeiten über Kalidüngung" (Potash Research), Volume II., Agricultural Press Ltd., Berlin. 478 pp., 123 illus. 9 RM. Obtainable in Australia through Pacific Potash Ltd., Scottish House, 19 Bridge-street, Sydney.

The work of the celebrated Agriculture Research Station at Berlin–Lichterfelde is described by Professor O. Eckstein in a recent publication which constitutes the second report in the series "Potash Research," of which the first volume appeared in 1931.

The book follows the logical sequence in its treatment, dealing firstly with soil problems, leading on to considerations of plant physiology, and thence to discussion of the chemical composition of feeding stuffs and description of experiments in animal nutrition.

The first section describes the nutrient and water relationships of soils and the Lichterfelde methods for investigating these properties, illustrating the theoretical discussion by reference to soils of Holland, Egypt and the Sudan.

The second portion deals with the role in plant nutrition of potash, of fertilizer materials generally, and of certain minor elements. An account of conditions associated with magnesium deficiency is of considerable interest.

The experiments in animal feeding described in the third section of the book were designed to investigate allegations of adverse affect on health following continuous use of foodstuffs produced with the aid of artificial fertilizers; apparently such allegations are not based on fact.

The book is attractively presented, set up in clear type, and the diagrams, illustrations, and tables are excellent. While German is used throughout, there are sectional summaries and many illustration titles in English.

W. R. J.

Milk Testing

By the Babcock Method

By J. M. Kerr, Superintendent of Dairying

THE usual method of ascertaining the percentage of butter-fat contained in a sample of milk is by means of the Babcock tester—so called from its inventor, Dr. Babcock, an American chemist. The principle of the tester is the same as that of the cream separator, the lighter fat globules being separated from the other constituents by centrifugal force. To facilitate the measuring of the fat in the test flask, a quantity of sulphuric acid is added to the sample. This entirely dissolves most of the solids except the fat, thus permitting its freer separation. Further, the acid darkens all parts of the milk except the fat, so that when the sample bottle is whirled in the centrifugal apparatus, and the fat is brought into the long graduated neck of the flask the percentage can be read off easily.

The importance of seeing that every sample is truly representative of the milk from which it is taken cannot be too strongly stressed. The milk must be thoroughly agitated before a sample is obtained. If it has been standing some time, and the cream has risen and set, the milk should be re-warmed before any attempt is made to mix it. The actual testing is described later.

Where the object of a testing is to learn, from one day's yield, a cow's butter-fat capacity over a several-day period (as is done in herd testing), it is essential that the sample be typical of the milk yielded in an even 24 hours, and in a 24 hours when the times of milking were the usual ones. Further, the cow must be milked "right out"; no stripping must be left. It is absolutely necessary that a sample of both morning and evening milk be taken; a variation is to be expected in the fat percentages of these milkings; almost invariably the evening's milk is less in quantity but higher in quality than that of the morning. Care must be taken to weigh and correctly record all milk which is sampled.

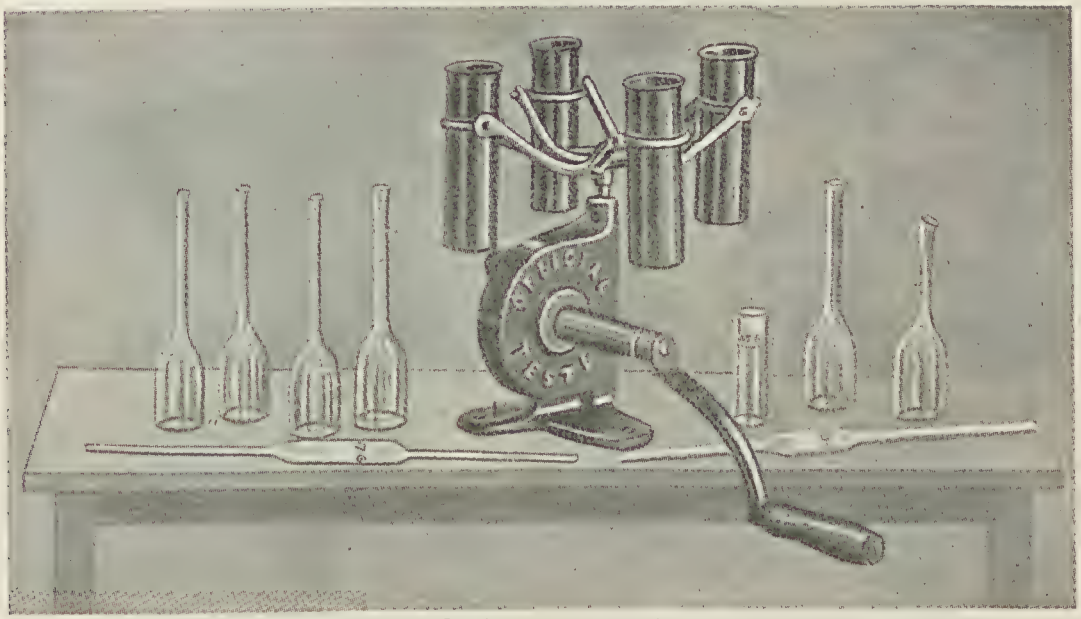
The making of an independent test of each of the two milkings is the easier method, but of course this means that there will be twice the samples to be put through the centrifuge. Sampling will then consist of—(1) marking the bottle with the cow's name or a distinguishing number; (2) weighing the milk yield; (3) recording the milk weight; (4) agitating the milk; and (5) dipping the sample—a few ounces—promptly from the bucket to the sample bottle. A 3-oz. vaseline bottle makes a most convenient sample bottle; if it is only half filled the mixing later for pipetting will be made easier.

If it is desired to make only one centrifuging operation for both the morning and evening milkings, sampling must be done on the composite principle. In composite sampling, the two samples are collected into the one bottle, but it is necessary to secure them in the correct proportions. This can be done by filling a sampling tube according to the depth of milk in a straight-sided bucket. If a plain tube be inserted to the bottom of the bucket it will fill to the height of the milk, and then by pressing one's finger on the top and holding it tightly there, the contents of the tube can be lifted for transfer to the sample-bottle.

The method of obtaining a composite sample adopted by the Herd Testing Association in Victoria is by means of a pipette graduated into cubic centimetres, and a certain number of centimetres are taken for every pound of milk. It does not matter what quantity is taken so long as similar quantities are taken at both milkings. It is always well, however, to have some sample milk available in case of a mishap during testing. A good working rule is—

For cows giving over 36 lb. daily	1 c.c. per lb.
For cows giving between 18 and 36 lb. daily	2 c.c. per lb.
For cows giving between 12 and 18 lb. daily	3 c.c. per lb.
For cows giving under 12 lb. daily	4 c.c. per lb.

What must be particularly remembered is the number of centimetres per lb. taken from the milk of a cow at the first sampling, so that



A Testing Outfit suitable for Small Farms.

an equal quantity may be secured at the second sampling. If this rule be strictly observed, the mixture of the two samples will be essentially of the same composition as the cow's whole daily yield would be if her two milkings were mixed, no matter how different one may be from the other in test or in quantity.

Composite sampling, though entailing more thought and care in collecting, means a reduction in the number of samples to one-half those necessary if a sample from each milking be tested. The saving of labour will be considerable in those cases where independent testing of the morning and the evening milk would provide more samples than the centrifuging machine is capable of holding at one time.

The actual work of testing, whether the samples are composite or single, is performed in exactly the same way.

If the test cannot be made before the milk is likely to sour, formalin—one drop to each ounce of milk—may be used as a preservative.

The various requirements, &c., in the work of testing may set out briefly as follows:—

A firm, clean table or bench is essential, and a supply of hot water should always be at hand. The centrifuge is fixed firmly on the bench ready for turning, and should be well oiled. On the table are set out the milk samples; a shallow tray, about 3 inches deep; a small water bath, about 8 inches deep; and the glassware, which consists of a 17.6 c.c. pipette, one test flask for each sample, the acid measure (17.5 c.c.), a bottle of sulphuric acid of 1.827 specific gravity and between 60 and 70° F., a Fahrenheit thermometer with a range extending above boiling point, and a pair of small dividers for reading the test figure.

Half-fill the shallow tray with water at about 108° F., and, making sure of the fastness of the identification markings, set the samples in the tray to warm. Mark the test flasks (on the sand-blasted spot) for subsequent identification, setting them out in a handy position, and in order, on the table with the pipette ready for use. Lift each sample bottle in turn from the warming water, and shake gently to mix the contents thoroughly, but without buttering. The shaken samples in the shallow tray are then placed in cold water, and the contents cooled to about 70° F. before pipetting. The acid should be brought to a similar temperature also by standing the bottle in water. *Be careful never to add water to sulphuric acid; this is a dangerous practice.*

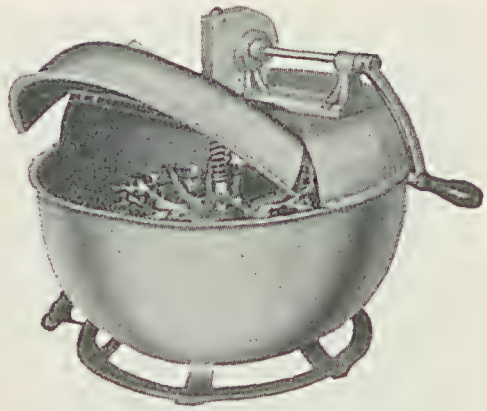
When the temperature of the milk has come down to about 70° F., pipette it from the sample bottle to the test flask. To do this correctly, shake the sample bottle gently to mix the milk constituents thoroughly, and, quickly inserting the pipette, draw the milk up to near the top. Then slipping the forefinger between the lips to the top of the pipette, catch and hold the milk above the line. Hold the pipette up level

with the eyes and, lightening the pressure of the forefinger, release the milk very slowly from the pipette to the line level, taking care to arrest its excessive drop by renewing the finger pressure in time. Should any fumbling occur in catching with the forefinger, the sample must be reshaken before redrawing.

Transfer this measured pipette of milk into its correspondingly marked test flask, being careful not to spill any in the process. When using the thick type of pipette, only the tip of which can be inserted. it is best to hold the flask on a slant, thus giving freer exit to the escaping air and obviating splashing. The thinner and more modern type of pipette may be set in the flask right up to the bulb, and requires no further control in the releasing. Blow the last few drops out of the pipette into the test flask, but do not blow through the pipette into the milk when pipetting, as this causes froth, and is apt to affect the correctness of the measure. Similarly transfer milk from each sample to its correspondingly marked test flask, and set each flask as it is filled to the right of the previous one; all the flasks will then stand in regular order from the left when filling is completed

Measure out the prescribed 17.5 c.c.'s of acid, and, holding the flask on the slant by the neck with the thumb and forefinger, carefully and slowly release the acid into the flask, rolling the flask between the thumb and forefinger while doing so. In this way the acid washes all the milk out of the neck. Holding the flask by the neck, shake with a gentle rotary motion to thoroughly mix, taking care that none of the curdled milk gets into the neck, where it might escape the acid's action and give trouble later. Rotating may cease when the darkening of the contents becomes uniform throughout—a matter of one quarter of a minute or so. All the samples having been treated in the manner suggested, are ready for centrifuging.

Place the flasks in the machine, observing the same order of position as that followed throughout the process. If the machine is designed for a greater number of flasks than that being used, care must be taken to see that balance is preserved in placing them, as the machine turns at a great speed, and lack of balance is dangerous. Turn it the correct speed for the particular machine, this usually being indicated on it, and maintain that speed for five minutes. Allow the centrifuge to slow down, do not stop it suddenly, then pipette into



A 12-bottle Babcock Tester.

each flask enough clean hot water to bring the level just up to the neck. It is important that the water used for this purpose be free from minerals; it should never be at a temperature less than 180° F., and in cold weather almost boiling.

Centrifuge for another two minutes, then add more hot water to float the fat column into the graduated neck of the flask. Care is necessary when introducing this last amount of water because very little will cause it to overflow from the narrow neck. Centrifuge finally for one minute, and while the machine is slowing down prepare a water bath in which to stand the flasks. The water must be near a temperature of 140° F. (never more), and while sufficiently deep to fully cover the fat column, yet not deep enough to risk the water entering the mouth of any flask. Transfer each flask from the centrifuge to the prepared bath. If many bottles are being used, the possibility of the level of the water being raised sufficiently to enter the necks must be guarded against.

Everything is now ready for the entering up of the butter-fat percentages. Commencing with No. 1 sample, and holding the flask upright, place the dividers along the neck, adjusting the two metal points to the utmost top and utmost bottom of the fat column. Having obtained the correct spacing, remove the dividers and place the lower point on the nought mark of the graduations. Read off the figure corresponding to the upper point of the dividers, and this will give the butter-fat percentage or the number of pounds of butter-fat contained in 100 lb. of milk. This figure is commonly referred to as the "test." Enter up each test on the record sheet as it is read, making sure

[*Continued on page 211.*

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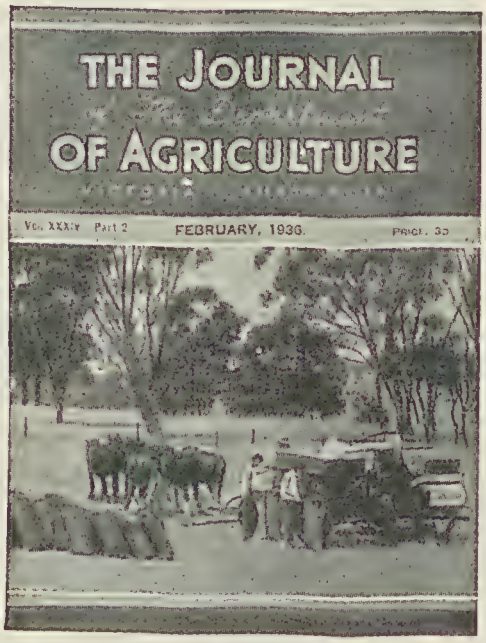

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Butter Production and Export

The following tables show :—

(*a*) Factory production of butter and cheese in Victoria for the period July to November, and for the months of December, 1935 and January, 1936, compared with the corresponding periods of 1934, and

(*b*) Quantities and percentages of various grades of bulk butter examined in Victoria from 1st July, 1935, to 29th February, 1936, in comparison with the corresponding period of 1934–35.

FACTORY PRODUCTION OF BUTTER AND CHEESE IN VICTORIA (QUANTITIES IN TONS).

Month.	Butter.		Cheese.	
	1935–36.	1934–35.	1935–36.	1934–35.
July to November (inclusive)	32,988	28,042	2,515	1,982
December	8,476*	8,761	574*	514
January	6,604†	7,270	444†	434
Totals seven months	48,068	44,073	3,533	2,930

* Revised. † Subject to revision.

BULK BUTTER EXAMINED FOR EXPORT IN VICTORIA (QUANTITIES IN TONS).

Period.	1935–36.					Period.	1934–35.				
	How Graded—				Total.		How Graded—				Total.
	Choice.	1st.	2nd.	Pastry.			Choice.	1st.	2nd.	Pastry.	
1st July to 1st February ..	20,229	9,834	2,195	293	32,551	1st July to 2nd February ..	12,697	13,986	2,274	302	29,259
2nd February to 29th February	1,396	1,038	323	65	2,822	3rd February to 2nd March ..	1,216	1,572	374	68	3,230
Totals 1st July to 29th February	21,625	10,872	2,518	358	35,373	Totals 1st July to 2nd March ..	13,915	15,558	2,648	370	32,489
Percentages ..	61·1	30·8	7·1	1·0	..	Percentages ..	42·8	48·0	8·1	1·1	..

The Boning of Poultry

By M. D. Hall, Poultry Dressing Demonstrator

THOUGH the boning of fowls is rarely practised, it is common enough with turkeys, especially crooked-breasted ones, where the twist in the keel of the breast makes neat carving of the meat almost an impossibility.

After killing and plucking, hang the carcass for at least six hours so as to permit the blood and oily internal fat to solidify. The presence of liquid blood may give the flesh an objectionable colour, and the saving of the internal oil is very necessary for successful cooking.

The first operation is the drawing of the sinews. This is done by breaking the shank half-way between the foot and the first joint of the leg. Before breaking, cut the skin of the shank, but across the front only; any incision across the back may partly sever the sinews and cause them to break. Extend the lower portion of the shank over the edge of the table, or any other support convenient, and snap the bones. *Do not cut the shank off,* but twist it round a few times in such a way as to cause the bone to protrude through the skin. A piece of rope or wire shaped into a noose and fastened to a post or wall is necessary to draw the sinews. Place the lower part of the shank and foot crosswise in the noose (Fig. 1) and the lower part of the shank will act as a lever. Grasp the leg firmly around the knee, causing as little pressure as possible on the fleshy part of the leg, and so minimizing the risk of tearing the skin from the flesh; then with a downward pull the sinews will come away from the broken shank with the foot.

Chop off the leg immediately above the shank; this will simplify the extraction of the leg bones. It is important for the operator to bear in mind that the bird must not be drawn or disembowelled.

Attention must now be given to the neck. Make a small incision *across* the back of the neck half-way between the head and shoulders, insert the point of the knife and make a long parallel cut towards the shoulder-blades; then turn the bird on its back and cut the skin right across the front of the neck just opposite where the small incision was made in the back of the neck.

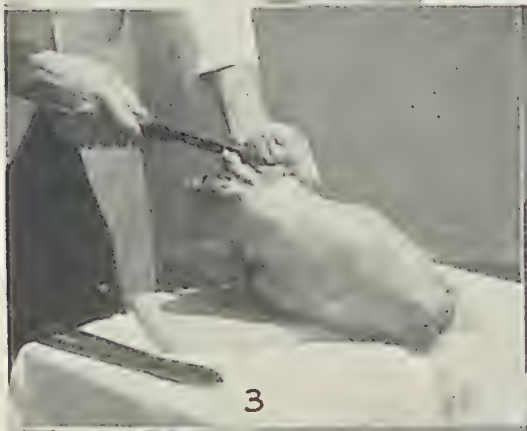
Grasp the neck and gullet with one hand and with the other pull the neck-skin over the breast, thus exposing the crop. Disconnect the crop from the skin; cut the gullet off close down to the wish-bone, and cut the neck right off about an inch from the breast, leaving the carcass minus neck and lower portions of legs. Also cut the wings off at the second joint or forearm (Fig. II.). A narrow, keen-pointed knife of medium length is essential to separate the flesh from the bones—one that will work close to the bone without mutilating the flesh to any unnecessary degree.

Next, lay the carcass breast down and carefully insert the knife the whole length of the shoulder-blade, taking care not to puncture the skin. Clear all flesh away from the shoulder-bone, working deep down to the base of the wing or upper arm, and with the point of the knife disjoint the right wing, but be careful not to cut it off (Fig. III.). Then take a firm grip of the wing with the left hand and force the upper arm up in such a manner as to expose the kunckle. Clear all flesh from the bone down to the forearm, and the bone will come away. Then deal in the same way with the other wing.

Turn the carcass on the back and with the point of the knife outline the wish-bone and it may be easily withdrawn (Fig. IV.). With the wish-bone removed, move the knife carefully towards the breast-bone and up and along the keel until it is possible to force the leg forward and the leg-joint is exposed. This joint protrudes from under the breast-meat which has been cut away and appears inside out. Disjoint, *but do not cut off* (Fig. V.). Clean the flesh away from the knuckle and along the thigh-bone to its base; disjoint and it will come away. Cut all flesh from the other bone commencing at the knuckle, and it too will come away. Then treat the other leg in the same way.

With both legs boned all that remains to be done is to trace the bone structure along both back and front towards the tail. By forcing the flesh away from the bones, the fillet turns inside out. After leaving the point of the

The Boning of Poultry



breast-bone the operator must be careful not to interfere with the bowels, which have no protection other than a layer of fat and membrane. By working along both back and front, the bone structure of the carcass can be got away completely. Some people favour leaving on the tail, but personally I view it as a bony substance, and therefore favour removing it. Fig. VI. illustrates a completely boned and rolled carcass.

Vintage Reminders

Avoidance of Wine Diseases

By D. C. Quinn, Special Horticultural Instructor

THE vintage season is drawing near, and a great deal of preparatory work in the fermenting house must be repeated each year, in order that the operation of converting the grapes into wine, may be conducted under hygienic and aseptic conditions. During the vintage period, the chief point every wine-maker is concerned with is the production of a sound wine which will not harbor disease germs during its after-life, and perhaps the main factor controlling this matter is the early elimination of yeast cells killed during the fermentation period.

The most favorable temperature for yeast development ranges between 68 and 77° Fahrenheit, and in cool climates, or where efficient cooling systems are available to prevent the temperature of fermentation rising much above these limits, anaerobic diseases are practically unknown in dry wines. In fact, when they are introduced into such wines, they fail to develop, presumably owing to the lack of suitable proteic or phosphatic matter, each of which may singly prove to be the factor limiting the activity of the organisms inducing fermentation or putrefaction.

The soluble nitrogenous content of a normal must amounts to approximately 0.4 per cent. only, whereas the protein content of dry yeast exceeds 40 per cent., all of which is drawn from the must. It follows therefore that the yeast crop, which develops during fermentation, absorbs into its body practically all the nitrogenous (and phosphatic) matter that is present in the must in a suitable form, and so the wine is rendered an unsuitable liquid for the support of foreign organisms during its maturation period. Knowing these facts, it has long been the custom to stimulate a languishing yeast fermentation with ammonium-phosphate, while, on the other hand, manufacturers of sweet cider and sweet unfortified wines, base their processing methods upon this so-called principle of nitrogen starvation, by separating the yeast crop from the liquid before all the sugar has been converted. They rely upon the fact that, even if spores of yeast or bacteria again come in contact with the wine, they will not multiply in the absence of either suitable protein or phosphatic matter.

In general wine-making there is a very important point related to the above matter, and this is whether the yeast cells are killed or not during the process of manufacturing a particular wine, for there is a great difference between the properties of a living and a dead yeast cell. In the case of a living cell, the cell contents are firmly retained within the cell wall, but, in the case of a dead cell, by the action of osmosis and bacteria, the proteic and phosphatic contents of the dead cell are dispersed, thus making the wine again a suitable nutrient for the development of the bacterial organisms to which we know some wines are liable.

The practice of wine-making in Australia has been largely copied from France, where no fortification is carried out, and where lower densities and lower fermentation temperatures prevail. In such circumstances the nitrogenous and phosphatic matter, suitable for the nutrition of yeast and other low organisms, becomes locked up within the body of the yeast during the process of fermentation and when the sugar supply is exhausted, the yeast cells simply gravitate to the bottom of the storage vessel in a live but dormant form. In this state they retain their body contents, and can be safely left in contact with the wine, until the usual mid-winter racking.

If, on the other hand, we review wine-making as performed in many parts of Australia, there are some definite differences to be noted. Densities and fermentation temperatures are generally higher, and much of our wine is prepared for markets demanding fortified wines. Yeast cells are killed by high temperatures or by fortification, and the result of wine remaining in contact with dead yeast has been previously stressed. It follows then that, under such conditions, a much earlier separation than usual of the new wine from its gross lees, must be the objective.

Downy Mildew and Mouldy Grapes.

The trouble of surplus nitrogenous matter in a wine also may occur from another source, viz., grapes damaged by downy mildew, by moulds; or when grown on heavy flats, they are abnormally rich in protein matter, and wine made from such grapes retains this fault and is consequently suitable for bacterial development after fermentation. In this case the only treatment is to sulphite the wine at the first signs of cloudiness, in order to still the activity of the causal organism, and then apply the usual methods of clarification.

Summary.

Having indicated the points which predispose a wine to disease, the following precautionary measures may be advocated:—

(1) Crush the grapes at as low a temperature as possible.

(2) As sulphur dioxide in certain concentrations inhibits the activity of wine bacteria to a far greater extent than yeast, it is usual to encourage a clean fermentation by adding 3 to 4 oz. of potassium meta-bi-sulphite and an equal weight of tartaric acid per ton to the must, immediately after crushing.

(3) Start the fermentation as quickly as possible by adding 2 to 5 per cent. of a starter from a tank in active fermentation, if a prepared starter is not available.

(4) Aerate all sulphited musts for ten minutes every day to prevent the formation of sulphuretted hydrogen.

(5) Endeavour to keep the temperature as favorable to the yeast plant as possible by the use of coolers or by racking from one vessel to another.

(6) Early racking is desirable. As soon as fermentation ceases and the wine is transferred to the storage vessels, yeast sedimentation begins. Within three or four weeks, the wine may not be bright, but a considerable amount of sediment will have accumulated. The relatively clear wine should be decanted from this without delay, and again at mid-winter as usual.

This extra early racking is one of the more recent innovations in Australian wine-making practice, and the foregoing remarks have been drawn up mainly to illustrate the reason for this procedure.

Milk Testing *(Continued from page 206).*

that each cow gets its correct figure. All readings should be made smartly and immediately after the flask is lifted from the bath, as the contents begin to shrink, and delay means faulty reading.

To find the total amount of butter-fat which any given weight of milk contains, multiply the pounds of milk by its test, and divide by 100. *Example*—35 lb. of milk at 4.2 test = $35 \times 4.2 \div 100 = 1.47$ lb. butter-fat.

Some extra points to be remembered by all testers of milk are that sulphuric acid must be handled very carefully, as it will ruin any fabric which it touches, and will burn flesh severely. Never, by any chance, should the risk be taken of sucking it into the pipette with the mouth. If a thermometer or any other glassware is used for acid, it should be rinsed immediately afterwards so as to avoid the chance of a curdled sample by its inadvertent use later. Though the flask must be held slopingly when introducing the acid, it must be held quite upright when measuring the fat column with the dividers. Pipettes, or any similar circular glassware apt to roll, should never be left loosely on the table during centrifuging; the vibration is almost certain to shift their position and may cause breakage.

Preserves—Sweet and Savoury

By Miss A. Knight, Fruit Preserving Expert.

THE varied collection of fruit now procurable enables the housewife to serve healthy and appetising dishes; also to preserve some for future occasions when fruit is scarce.

Tomatoes.

The long dry summer has put colour and flavour into tomatoes; these are now plentiful, and in splendid condition for bottling in air-tight jars, or in lacquered cans, which are quite simple to use.

Tomatoes are also in a nice condition for converting into sauce and relish. The juice is simple to preserve, and is useful in the making of soup and for summer and winter beverages.

As an accompaniment to roast beef or for serving with a breakfast grill, they are best when preserved in the following manner:—Peel by immersing quickly in boiling water, and then immediately in cold, so as to cool them quickly. Remove the skin without tearing the flesh, and pack them firmly into jars or cans. Any space between the fruit should be filled with a little seasoned tomato juice or slightly salted water. The best seasoning for tomatoes is pepper, salt, a bay leaf, and a little butter. The jars or cans should then be heated to a temperature of from 180 to 212° F. and kept at that heat for 25 to 30 minutes when they will be ready for sealing.

For a tasty tomato relish take the following ingredients:—

8 lb. tomatoes.
4 lb. sour apples.
2 lb. onions.
2½ lb. sugar.
2½ pints vinegar.
1 dozen cloves.
4 level teaspoons salt.
Good sprinkle of pepper.
1 tablespoon preserved ginger (chopped).

Peel and cut up the onions; wash the tomatoes and apples and cut them into sections. Then put all the ingredients into a preserving pan or casserole, and cook at a low heat in the oven, or on the hot plate, or over a closed stove. The time usually required is about 2½ hours. When the right colour and consistency are obtained, pass the relish through a sieve having a medium-sized mesh; when sieved, reheat the sauce and bottle.

Pears.

The William Bon Chretien and the Packham's Triumph are the best pears for bottling in syrup; they should be used when firm ripe, though not quite so ripe as when eaten raw.

Bottling tomato relish.

Other varieties of hard firm pears make an excellent conserve if given rather a long slow cooking and are well flavoured with ginger or such other flavour as is fancied.

The cooking may be done in the oven while the dinner is also being cooked. The fruit should be put into a covered pan and placed on a lower shelf or wherever the heat is slowest. Spiced pear, or pear ginger when cooked in this manner usually has a rich colour, and is tender in texture; further, the method means a saving in gas electricity, or wood. If not sufficiently done on the first day, the fruit should be put in the oven again when the next joint of meat is being cooked.

Showing the arrangement of various dishes in the oven.

1. Braised steak; 2. Joint and vegetables; 3. Preserve, quince or apple; 4. Custard (Nos. 3 and 4 in coolest part of oven); 5. Bottles being heated; 6. Bottled preserves.

Apples.

Other fruits suitable for oven cooking are apples and quinces. These, too, gain a rich colour by the slow cooking.

A nice apple marmalade may be obtained in this way:—For 6 lb. of apples (sour ones) allow 4 freshly-picked lemons, 4 lb. sugar. Peel, core, and quarter the fruit. Save the parings, and cook them in a covered saucepan with enough water to barely cover them (about 1 pint). Simmer for 15 minutes or so, then strain and measure the liquid; add an equal measure of sugar, and heat over a slow burner until the sugar is well dissolved; then boil briskly for five to eight minutes, and skim if necessary. Meanwhile, put the prepared fruit into an earthenware casserole, or other suitable utensil with a lid, and pour the clear syrup over it.

Cook the preserve, in a cool part of the oven, until the fruit is tender and nicely coloured. It is then ready for removal from the oven and placing in small jars. It might be well to give the liquid jelly a sharp boil before pouring it into the jars; this may reduce the quantity of jelly and make the preserve thicker; it will depend on the variety of apple used and the length of time it has been cooking. The jars should be sealed when cold.

A nice variety of preserve may be obtained by blending quince juice with the apple Thoroughly cleanse and cut up 2 quinces; boil them (skin, core, and all) in enough water to cover the fruit; keep a lid on the pan while they are cooking, and when the water is well flavoured with quince, and reduced to about half the original quantity, strain it and use for the making of a syrup; measure and allow 1 lb. sugar to ½ pint of liquid and boil 5 minutes. Meanwhile, peel, core, and cut up about 6 juicy apples (sour ones are the best); cut each one into 6 or 8 pieces; add these, a few at a time, to the hot syrup, and let them cook until tender and clear; allow the preserve to cool and remain for 24 hours; the fruit may then be carefully removed and packed into small jars; the syrup should be reduced by rapid boiling for a few minutes and when sufficiently thick, should be poured over the fruit and the jars sealed.

A pleasant flavour may be obtained with this preserve by boiling 2 or 3 thick slices of pineapple in the water which is to be used for the syrup, and about ¼ teaspoon of citric acid to each pint of strained juice. Another variation may be had by flavouring the syrup water with freshly-picked mint, and a few cloves.

When using a quantity of apples and quinces the cores and peelings should not be wasted;

these will make an excellent jelly or a fruity dressing for other purposes. To 1 lb. of the parings allow 1 pint of water; cook in a covered pan for about 40 minutes or so; strain, and measure the liquid, and to each pint allow ¾ lb. sugar and ⅛ teaspoon citric acid; boil rapidly until it jellies; this usually takes about 15 to 20 minutes. If it is to be used for dressing just bring it to the boil, and then bottle and seal while hot.

Crab apple sherbet is a pleasant beverage. Take 4 lb. of crab apples and cook them in 2 pints of water until they are tender and then strain the liquid so that it is nice and clear. Meanwhile boil 1 pint of water, 1 lb. of sugar, and ½ teaspoon of citric acid together in a suitable pan, and let the liquid get quite cold. Then mix equal parts of the crab apple juice and the cold syrup and freeze the mixture.

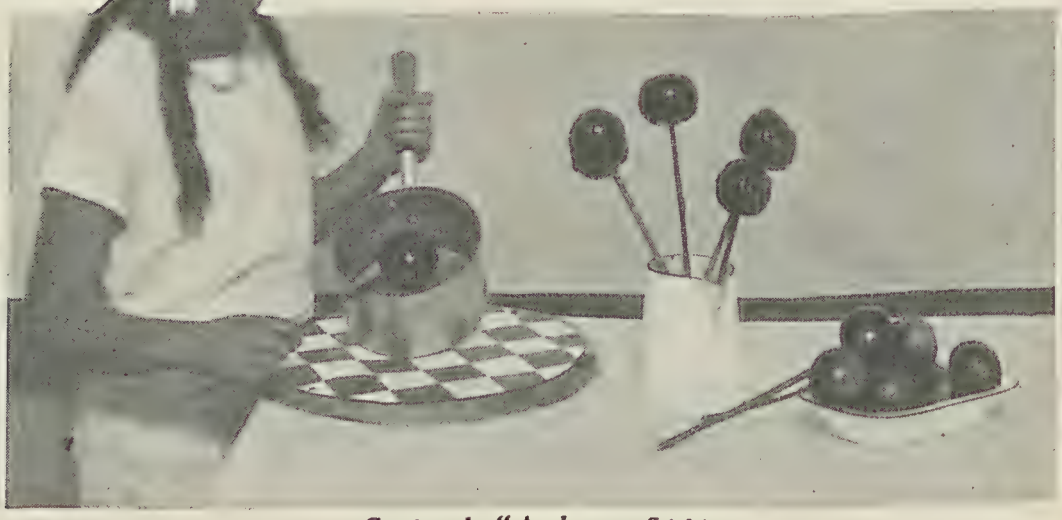
Another nice frozen sherbet is obtained by blending:—

1 cup of grape juice (black muscatels are nice).
¼ cup of orange juice.
2 tablespoons lemon juice.
Two-thirds cup sugar.
1½ cups water.

Boil the sugar and water together for 5 minutes and let the resulting liquid become cold. Mix the fruit juices and strain them into the cold syrup and freeze the mixture.

When preparing various fruit mixtures for freezing, always remember that if they are to be served unfrozen they should be more highly flavoured than would be necessary otherwise.

A very nice confection is what is known as "Apple on a Stick." Select some little apples with bright red skins; clean them thoroughly and make sure that they are quite dry and shiny; then get some little sticks about as long and thick as a pen handle; sharpen them at one end and insert one neatly in the stem end of each apple. In a suitable saucepan, make some toffy from 1¼ lbs. of white sugar (that is about 2½ cups), ¾ of a cup of cold water (same sized cup), and a pinch of cream of tartar. Put these together in the saucepan, and heat very gently until the sugar has quite dissolved; let the sugar all melt before the mixture actually boils; when it does boil stirring should cease; then boiling should continue till the liquid looks like thin honey, or until it takes a very light amber tint. It is then time to test it. This is done by taking a cup of cold water and letting a drop of the toffy fall into the cup; if it sinks to the bottom and remains quite hard it indicates that the toffy has been boiled sufficiently, but if the little lump sinks to the bottom and is soft when pinched, the toffy should be boiled for a minute or so longer, and tested again. Let the toffy cool for a few minutes, but not too long; then holding the end of the stick gently turn the apple in the toffy so as to give it an even coat; in a few minutes you will have nice looking apples with a dry glossy coat; stand them up carefully and do not let them touch each other until dry.



Coating the "Apple on a Stick".

Orchard and Garden Notes

By Edward E. Pescott, F.L.S., Senior Horticultural Instructor.

Shirley Poppies.

The Flower Garden.

IN districts where there is no artificial water supply the best floral effects are obtained in spring time, for then plants bloom most freely following on the autumn and winter rains. An early planting or seeds-sowing is desirable, so that strong plants may develop before winter sets in and checks the growth The soil is still warm, and if planting be done now, the roots will take hold of the soil quickly and healthy plants will result. Late-sown seeds give poor plants, and late-set plants never develop a strong flowering growth until spring, when it is often too late to expect a rich crop of bloom.

Stocks and Wallflowers should now be planted out. Both are lime lovers; further, they should not receive too much water. Pansy seeds may be sown and the plants set out as soon as possible. The Pansy is not a lime lover, but it revels in cow manure, and the plants may be given a very heavy dressing at any time. Cinerarias should be planted in shade, as the frosts of winter and spring play havoc with them. Lachenalia bulbs of all colours give a very gay show in spring; these and all other spring-flowering bulbs should now be planted.

The Orchard.

It is yet too early to estimate the damage done this season by the Codling Moth; but it has once more been clearly shown that to control the moth effectively, the main attack must be on the first brood.

A start should be made at once by destroying all larvae in the bandages, and by collecting and destroying all fallen fruit. Old cases should not be stored until they have been treated for larvae infection.

A common source of infection is found in cracked props, or in props carrying bark. This season one grower decided to burn all his bark-covered props, and to use sawn timber in future.

The efficacy of green manure for orchards is well known, and the green manure crop should now be sown. An early crop will yield far more herbage for ploughing in than a late one.

Tick beans give a very strong growth; in some districts they grow to a height of from 5 to 6 feet. No one should be deterred from sowing these for fear of difficulty in ploughing them in. It is far better to have a goodly supply of green herbage than none at all. Field pear, tares, oats, barley, rape, and other crops are recommended; one is necessary, it does not matter much which is used.

The Vegetable Garden.

Seeds, cuttings, or divisions of all herbs should now be given attention in the borders. Practically all herbs are lime-lovers; and when the plants are well rooted in the soil, they should receive an autumn lime-dressing. The same advice may be given about Lavender, which is often grown as a border plant in the kitchen garden.

Seedlings of cabbage, cauliflower, sprouts, and similar plants should be set out in rows.

Only very old manure should be used in the soil; later, when the plants are firmly rooted, they may be given a blood and bone or a sulphate of ammonia dressing. As these plants grow, the soil should be well tilled around the stems, so as to induce an additional root system.

In early districts, onion seed may be sown, even the brown Spanish may be included. The "odorless" onion is of the brown Spanish type, and seed of this may now be sown. The sowing may be done in the rows or in the seed bed. If in the latter, the soil should be very light and sandy to permit easy transplanting.

A good crop of broad beans may be sown; the seed should be soaked in a weak, pale-blue solution of sulphate of copper (bluestone) to check attacks of "brown spot" or anthracnose.

Nhill Crop and Fallow Competition, 1935

(*Continued from page* 199).

shear points attached) in November and again in December.

Mr. C. P. Dahlenburg had prepared a large area of fallow, all of which was in creditable order. His two exhibits on black land had been carefully worked, and showed a very even seed bed. The No. 1 entry was broken up with a sundercut in March, scarified early in August, combined in September, and given a stroke of the harrows (with shear points attached) in December. The No. 2 exhibit had been fallowed with a sundercut in June, harrowed in August, then worked similar to the No. 1 entry.

Some good summer fallow was shown also by Mr. P. Bone. It had been disked in autumn, scarified in June-July, and worked three times with the combine.

Mr. H. Leyonhjelm's two exhibits were in very good order. The Mallee land entry was comprised of uneven land of a crabholey nature, but a splendid job had been made. The paddock was fallowed from grass with a mould-board plough in July and August, harrowed immediately, scarified in September, and cultivated with a combine in November. His red ground entry, of strong clay loam, with a heavy clay subsoil, had been given an extra stroke with the harrows and scarifier. It showed a good mulch of even, moderately-sized clods.

Messrs. Dufty's fallow on heavy red and grey Mallee land was particularly clean. The paddock had been out to grass for three years, and after being broken up with a disk in March, it was scarified in May, spring-toothed in July, then harrowed. Two further cultivations were given with the spring-tooth in September and October, and a good mulch was prepared, of even depth, though a little rough in places.

Highest points in the red land section were awarded to Mr. C. P. Dahlenburg's No. 2 entry, comprised of heavy, uneven ground, mostly clay and clay loam. On this exhibit weeds had been well suppressed, and the mulch was worked into a good cloddy condition. It had been mould-board ploughed in June, given two strokes with the combine and finally harrowed (with shear points attached) in December.

"E. Bound and Sons" Competition.

This competition extends over a four-year period, and is for the highest points obtained for 50 acres of black fallowed land in 1933, 1934, 1935, and the crops grown thereon. The judging of the crops in 1936 will bring the contest to a conclusion. The progress awards to date are shown in the accompanying table:—

Competitor.	Fallow, 1933.	Crop, 1934.	Fallow, 1934.	Crop, 1935.	Fallow, 1935.	Progress Total.
Maximum Points ..	**100**	**100**	**100**	**100**	**100**	**500**
C. P. Dahlenburg ..	96	93	97	91	97	474
John Clark ..	95	80	96	97	96	464
E. W. Dahlenburg ..	97	83	97	87	97	461
H. H. Sanders ..	94	84	96	89	96	459
E. G. Hoffman ..	93	92	92	81	97	455
P. Bone	96	82	93	83½	97½	452
R. Blackwood ..	95	87	95	79½	87	443½

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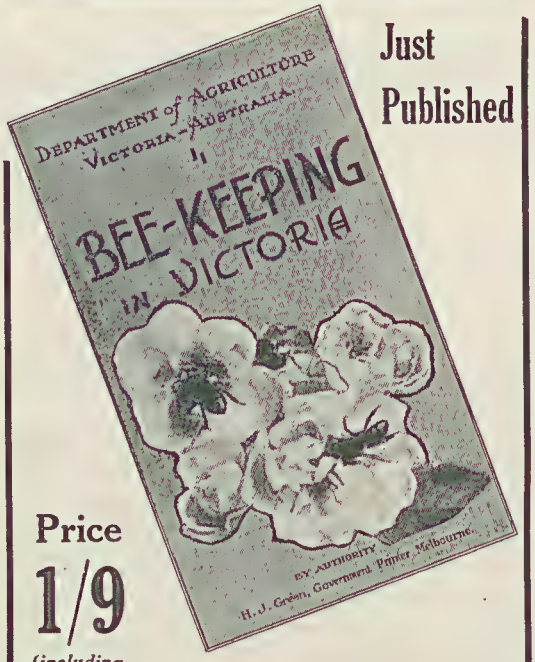

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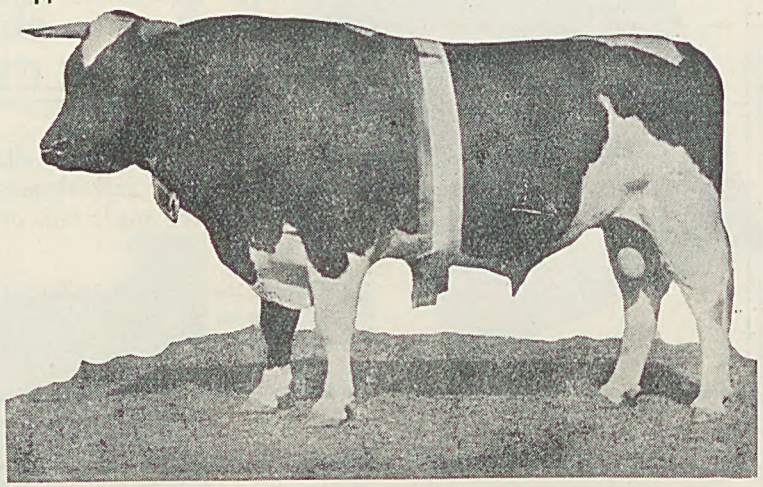

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